Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

REPORT ON
PRESENT AND ANTICIPATED AGRICULTURAL CONDITIONS

YAZOO HEADWATER PROJECT
PARTS I, II AND III
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

PREPARED BY THE
U. S. DEPARTMENT OF AGRICULTURE FOR THE
MISSISSIPPI RIVER COMMISSION

SOIL CONSERVATION SERVICE
JACKSON, MISSISSIPPI
OCTOBER, 1957

PREFACE

The complete Yazoo Headwater Project report covers three separate studies. This report has been prepared by the Soil Conservation Service, U. S. Department of Agriculture, covering studies made under authority of Section 6, Public Law 566, 83rd Congress and upon request of the Mississippi River Commission. Parts I and II cover those items as outlined in General Memorandums No. 7 and 5 respectively issued by the Field Advisory Committee; Part III covers items of reconnaissance scope detail similar to Part II on specific watersheds and is by special request of the Eastern Tributary Section, Vicksburg District, U. S. Army Engineers.

Part I study area is entirely within the Yazoo-Mississippi alluvial floodplain. Seven separate detailed studies were made within areas outlined by the U. S. Army Engineers. These studies consisted mainly in evaluating the agricultural benefits that would accrue through increased farm drainage as a result of proposed works of improvement by the U. S. Army Engineers.

These seven study areas are from north to south (1) McKinney Bayou; (2) White Oak Bayou; (3) Swan Lake; (4) Potacocowa-Teoc Creeks; (5) Big Sand Creek; (6) Pelucia Creek; and (7) Hillside Floodway.

Part II study is confined to the upland portions of Big Sand and Pelucia Creek watersheds. A detailed study was made to determine the present estimates of peak flows and sediment loads discharged into the Yazoo-Mississippi Delta and the effects a watershed protection-flood prevention program would have in the reduction of these items. Estimates of costs were also made for those measures contributing directly to these reductions.

Part III study is confined to specific watersheds in Carroll and Holmes County and is of a reconnaissance scope detail. The watersheds studied by counties are: Carroll County - Potacocowa-Teoc and Abiacha Creeks; Holmes County - Chicopa, Fannegusha and Black Creeks and their tributaries.

For comparative purposes the detailed studies previously made on Big Sand, Pelucia and Askalmore Creeks are included in this part of the overall report. Askalmore Creek, while not a part of the MR&T study, is similar to other hillside tributaries, and is being included only for informational purposes. More detailed information may be obtained from the Askalmore Creek Work Plan prepared by the Soil Conservation Service.

TABLE OF CONTENTS

PART I

	Page
Hillside Floodway	11
Pelucia Creek	31
Big Sand Creek	49
Potacocowa-Teoc Creeks	66
Swan Lake Area	83
White Oak Bayou	99
McKinney Bayou	120

REPORT ON
PRESENT AND ANTICIPATED AGRICULTURAL CONDITIONS

YAZOO HEADWATER PROJECT
PART I
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

REQUEST FOR STUDY

Specific request to initiate this particular project area study was made March 6, 1956 as noted in General Memorandum No. 1 issued by the Field Advisory Committee on the same date. The basis for study was agreed upon as set forth in project study statements issued at intervals prior to initiation of study on specific sub-projects.

AGENCY PARTICIPATION AND RESPONSIBILITIES

A U. S. Department of Agriculture memorandum of understanding between the Soil Conservation Service, U. S. Forest Service and Agricultural Research Service relating to interagency coordination of programs in Watersheds was consumated February 2, 1956. This memorandum provided for the organization of a Field Advisory Committee consisting of members of the above agencies with the Soil Conservation Service representative as chairman. Responsibilities of each agency were outlined by this Field Advisory Committee and incorporated in Mississippi River & Tributary Project Study General Memorandum Number 1.

The Soil Conservation Service has primary responsibility in classifying the soils of the area in accordance with an established legend. It has estimated land use and cropping patterns, extent and cost of land use conversions, extent and cost of farm and group drainage systems, extent and cost of farm irrigation systems for row crop and pasture lands.

The Agricultural Research Service has primary responsibility for developing field crop and livestock commodity price data, production cost for field crops and livestock enterprises, interest rates for capitalization, amortization, and discounting; and has assisted the Soil Conservation Service in the preparation of basic yield tables of field crops and pastures and in overall economic procedures.

All woodland yields, values and costs were developed by the U. S. Forest Service. The extent and location of dedicated woodland and other woodland areas not subject to land conversion were determined by the U. S. Forest Service.

Additional material and information required to make reliable estimates in this project study were obtained from the Mississippi State Extension Service, Experiment Station, SCD Commissioners and other individuals most familiar with the agricultural conditions and problems in the area.

METHOD OF COMPUTING AGRICULTURAL VALUES CREDITABLE TO PROJECT

Information and data presented in this report are intended to portray three different conditions with respect to land use, cropping patterns, crop yields, etc. - (1) existing conditions, (2) future conditions without project, and (3) future conditions with project.

Agricultural benefits creditable to the project will be the difference between the future net return with project and future net return without project. Associated costs in future with project conditions should be deducted from gross benefits to arrive at net return to the project.

LIMITS OF APPLICATION OF ESTIMATES

The estimates cover an appraisal of the agricultural values and costs that can be expected as a result of agricultural drainage in association with installation of the proposed project works. However, the data includes no estimates of flood damage reduction, its values or costs, though the land use and cropping pattern estimates reflect the flood protection that would be afforded by the proposed project works. Average flood-free yield estimates have been used throughout the study so that they can be used as a basis for calculations of flood damage reduction by the Corps of Engineers, based on its own hydrologic study.

The limits of project effectiveness established by the Corps of Engineers on the basis of engineering studies were accepted as the basis for compilation of agricultural data. All soils of such characteristics as to not require drainage have been eliminated from drainage evaluations. However, no attempt has been made by the Department of Agriculture to designate areas, within the limit of project effectiveness provided by the Corps, which, because of elevation might be drained without the project and hence not properly credited as benefiting from the project. Further engineering studies by the Corps may reveal the desirability of eliminating some acreages of that type from the computations contained herein. The Department of Agriculture does not have responsibility for that phase of the study.

GENERAL OVERALL DESCRIPTION OF THE PROJECT

Location and Size

The location of the seven study areas is confined to the eastern portion of the Yazoo-Mississippi alluvial floodplain and lies between the Bluff Hills on the east and the Yazoo River on the west to a point north of Belzoni, Mississippi; the western boundary then follows the proposed Upper Auxiliary Channel to Swan Lake thence along the watershed divide between the Sunflower, Tallahatchie-Coldwater Rivers to a point south of Moon Lake in Coahoma County to its point of contact with the Mississippi River Levee. It then follows the levee in a northeast direction to its contact with the Bluffs.

Within the limits there are approximately 1,472,000 acres; of this amount 577,260 acres are in areas to be studied in detail.

Authorized Works and Protection Afforded

The Flood Control Act of June 15, 1936 provides for additional protection to the Yazoo Basin from the Yazoo River and its four tributaries.

The approved plan consists of the following:

Four reservoirs in the headwater of each major tributary.
Local protection for Greenwood, Belzoni, and Yazoo City.
Channel improvement on the main stem and principal tributaries within the Yazoo Basin.
Levees, as necessary, along the main stem of the Yazoo-Tallahatchie-Coldwater Rivers.
An auxiliary channel leaving the Yazoo River in the vicinity of Silver City and re-entering the river at the mouth of the Big Sunflower River.

The four flood control reservoirs and local protection is complete for Yazoo City and partially complete for Greenwood; channel improvement has been completed on the Coldwater, Yocona, Little Tallahatchie and Yalobusha Rivers, Bobo Bayou and Arkabutla Canal. The improvement of the Yazoo and Tallahatchie Rivers is complete except for construction of two cutoffs on each stream. Considerable work has been accomplished on Cassidy Bayou. Only a small amount of levee construction has been accomplished to date. Construction of the Lower Auxiliary is underway.

As a result of these completed works of improvement, there has been a reduction in stage and decrease in the extent and frequency of floods in the Yazoo Basin. This in turn has caused considerable woodland to be cleared and put in row crops or pasture. This development will continue for sometime and probably increase to some extent as additional features of the planned and authorized programs continue in operation. Stages of development will be described in greater detail in each of the seven sub-projects.

What the Study Involves

This study consists of an agricultural appraisal and economic evaluation of agricultural development that will likely occur as a result of planned works of improvement, and the agricultural benefits that will accrue due to increased farm and group drainage and land conversions made possible by construction of these improvements in the following seven study areas:

(1) McKinney Bayou; (2) White Oak Bayou; (3) Swan Lake Area; (4) Potacocowa-Teoc Creeks; (5) Big Sand Creek; (6) Pelucia Creek; (7) The Hillside Floodway.

Major Streams

The Yazoo River is formed by the confluence of the Yalobusha and Tallahatchie Rivers two miles north of Greenwood, Mississippi. From this point the Yazoo runs in a southerly direction, roughly paralleling the Bluff Hills, to its confluence with the Mississippi near Vicksburg.

The major tributaries of the Yazoo River are: (1) the Coldwater River, which enters the Mississippi alluvial floodplain a few miles south of the Mississippi-Tennessee state line and flows in a southerly direction to its confluence with the Little Tallahatchie River south of Marks, which confluence forms the Tallahatchie River. It has a drainage area of approximately 1,403 square miles; (2) the Little Tallahatchie River, which enters the Mississippi alluvial floodplain southwest of Batesville,

Mississippi and flows in a southwesterly direction to its confluence with the Coldwater River; it has a drainage area of approximately 1,545 square miles from a point near Sardis, Mississippi; (3) the Yocona River, which enters the alluvial floodplain near Crowder, Mississippi and flows west to its confluence with the floodway of the Little Tallahatchie River; it has a drainage area of approximately 560 square miles; and (4) the Yalobusha River, which enters the alluvial floodplain southwest of Grenada, Mississippi and has a drainage area of approximately 1,960 square miles.

The drainage area of the Yazoo River at Greenwood, Mississippi is 7,450 square miles; at Yazoo City, Mississippi 8,900 square miles.

Dominant Soils and Land Use

There is a wide range of alluvial soils in the Yazoo Basin. The characteristics of the major streams, both old and recent, have contributed largely to this range in soil conditions.

Soils that are adapted to a wide range of plants are found along the natural levees or banks of the larger streams and bayous. These soils usually slope away from the streams, and have good surface and internal drainage and are usually of sandy loam or silt loam texture. It is on these soils that most of the cotton and corn is grown.

Away from the natural levees the topography becomes more nearly level and the soils become poorer drained and heavier textured. Soil management is more difficult and as a consequence the land use pattern changes. There is a higher percentage of land in grasses and legumes, small grain and soybeans. At the present time only a few acres are grown to rice. Most of the present woodland occurs in these heavy soils.

Smaller tributaries entering the Yazoo Basin have built up alluvial fans through local deposition. In places this local influence extends into the delta several miles. Recently efforts have been made to confine the flow of these tributary streams by small levees, usually constructed with material at hand-- silt and sand. Past experience has indicated there will be several storms of sufficient magnitude to cause breaks in these levees each year. When this occurs there is considerable damage to the land due to floodwater and detrimental deposits of sand.

Areas that are free of such deposition are used for cotton, corn, soybeans and some pasture and small grain. Sand deposits are usually idle, in poor pasture or allowed to grow up in native trees such as willow.

Yields

Present field crop and pasture yields used in project evaluation are based upon existing conditions with an average level of management. Existing conditions reflect present drainage, irrigation and technology.

Future yields of all crops reflect the influence of improved drainage conditions, improved technology, supplementary irrigation and a correspondingly higher level of management.

The yields shown in all zones are for flood-free years. The difference in yields between future conditions without and with the proposed project represents the increases expected through improved drainage.

Present forest inventories were determined to reflect current woodland values on an acre basis. Yields used in this report are the results of a weighted average of the levels of management on an acreage basis which it is anticipated that landowners would apply. Deferred yields have been appropriately discounted. Board foot and cubic foot units of production of wood products per acre are not shown in Tables II and III due to complexity of computations. For simplicity the yield has been consolidated into a per acre value of production.

Prices and Associated Costs

Projected prices as outlined in Mississippi River & Tributaries Project Study General Memorandum Number 6 (revised) for Mississippi were used in the evaluation of field crops and livestock enterprises. These projections represent the long-term levels of prices which can reasonably be expected to prevail with production and requirements in balance under competitive conditions and under assumption of a relatively high employment level, a trend toward peace, continued population and economic growth, and a stable general price level.

Woodland production values are based on average 1955 prices for forest products at the mill yard or railroad siding. Nineteen fifty-five prices are used since they appear to be realistic price projections for future conditions. The production values shown are present annual equivalent values of deferred incomes at a discount rate of 5%. Allowance is made for different levels of prices obtainable reflecting quality of the forest crop at different levels of management.

Crop Production Costs

Average production costs for crop and livestock enterprises were developed from studies of large and small farms in the Mississippi Delta. The costs for each crop and livestock enterprise include all preharvest, harvest, overhead and management charges required to obtain yields used in the project analysis. Some production costs are expected to vary directly with yields. The cost of picking cotton by hand is an example of this type of cost. Some costs vary with yield, but have a fixed minimum charge, as is usually the case with machine harvest of cotton. In such cases a minimum fixed charge was assessed and the rest considered as varying directly with yield. Still other costs such as land preparation, as an average, are constant. All costs were treated as either fixed or variable in accordance with principles illustrated in the preceding examples. These costs are based on a projection of prices paid by farmers which are approximately 96 percent of the 1955 level of costs incurred by farmers.

Moisture deficiencies during the growing season have resulted in the use of supplemental irrigation of cotton to some extent on the better drained soils within the past few years. Supplemental irrigation of

cther crops has been of minor importance. It is anticipated that there will be a steady increase in supplemental irrigation on cotton and corn and to a lesser degree on other crops under future with or without project conditions.

Operation and maintenance of the supplemental irrigation system was included as a preharvest cost. The initial cost, which was amortized over a 15 year period at 5 percent, was included in overhead. Costs were based on various combinations of surface and sprinkler irrigation systems according to soil mapping units.

Production costs for forest products are composed of the cost of conversion of standing timber to logs and pulpwood delivered to mill yard or railroad siding (harvest cost) plus the cultural and management cost of producing the crop (preharvest cost). The conversion cost per acre varies by estimated annual yield levels. The cultural and management costs are fixed annual charges weighted by percentage of acres at different management levels. The conversion costs shown are annual equivalent costs per acre discounted at 5 percent in the same manner as production values for deferred operation. Basic costs are those prevailing in 1955 as determined locally for project conditions and are estimated to be a reasonable level for projection to future conditions.

Net Crop Production Returns

The analyses by soil units and by major crop and livestock enterprises indicate that the gross value of production exceeds production costs for each enterprise within each soil unit. Positive net returns to land result. Direct comparison of these net returns to land between enterprises to determine feasibility of each is not valid. Associated costs, such as pasture installation and maintenance, directly chargeable to a specific enterprise affects its relative net value. Returns to management will also be considered by the landowner in making a choice of enterprises. An increase in the net return to land with project, as compared to without project conditions, is indicated for all enterprises except the woodland enterprises. Net return to woodland, per acre, is not expected to be affected directly, although such returns will be affected indirectly through the anticipated clearing of certain acreages and conversion to a more intensive use due to the influence of project works of improvement.

Land Use Conversions and Costs

Table VI shows the land use conversions that are expected to occur in the future as a result of project works of improvement and includes all cost of putting the new land into crops or pasture with the exception of farm and group drainage costs. Cost of clearing, land smoothing and pasture establishment are prevailing rates within the project and are estimated to be reasonable for projections to future conditions.

Rather large amounts of woodland are expected to be converted to cropland in the future with or without the project. A slightly smaller acreage is expected to be converted from woodland to pasture. The net

return for all row crops and pasture was greater than the net return from woodland. This increase in net return will tend to accelerate the conversion of woodland to other crops in both zones within the project.

All capital costs of conversions have been amortized at 5 percent for a period of 50 years. Annual maintenance includes cost of maintaining additional pasture established. This item is not included in cost of production.

SUMMARY

The installation of authorized and planned works of improvement will provide protection and adequate outlets for farm and group drainage on 577,260 acres of land.

It is anticipated that as a result of works of improvement the areas now subject to flooding will be reduced materially and that agricultural development will proceed fairly rapidly within the seven sub-projects.

As a result of agricultural development within the sub-projects, there will be an annual gross benefit of $1,496,318; annual associated cost of $627,468; with an annual net benefit to the project of $841,850.

INDIVIDUAL STUDY AREAS IN THE YAZOO HEADWATER PROJECT

I. HILLSIDE FLOODWAY

Description of the Area

The Hillside Floodway area is located in the southern part of Carroll and Leflore Counties and the western part of Holmes County and lies between the Bluff Hills on the east and the Yazoo River on the west. It comprises 185,730 acres of which 89,770 is between the maximum limits of overflow without the project and the outer limits of the study area (A Zone); 89,460 acres lies between the three-year frequency overflow with project in operation and maximum overflow without project in operation (B Zone); 6,500 acres is below the three-year frequency overflow with project in operation (C Zone).

Soils and Topography:

Within the A Zone approximately 24 percent of the soils are level, very poorly drained heavy clay; 41 percent level to gently sloping, somewhat poorly drained silt loam and clay loam soils; 34 percent gently sloping, well drained sandy loam soils; and 1 percent in swamp.

Within the B Zone approximately 73 percent of the soils are level, very poorly drained heavy clay soils. By far the greatest portion of these soils are subject to occasional overflow from the Yazoo River or the Bluff tributaries.

The C Zone consists of heavy clay soils 95 percent of which are subject to occasional overflow; the remainder is in swamps and water areas.

Problems Within The Project

Prior to the completion of the four flood control reservoirs in the headwater of the Yazoo River system areas within the B Zone were subject to frequent flooding from backwater. At the same time floodwaters and sediment were being discharged into the area from the bluff tributaries. Much of the low lying heavy clay soils and depressional areas associated with the better drained soils could not be utilized properly due to floodwaters remaining on the land until late spring or early summer. This condition affected the better drained lands by not providing proper drainage, delayed planting of desired crops, and isolating areas until floodwater could recede.

Existing Works of Improvement

Existing works of improvement consist of channel improvement in the main stem of the Yazoo River. Local drainage districts have endeavored to confine the flow of tributary streams in the Delta by channel improvement and levees constructed of local material. This has not

proved satisfactory since the channels have filled with sand and the levees break frequently.

Proposed Plan of Improvement

The Hillside Floodway will intercept and divert flows from Abiaca, Chicopa, Fannegusha and Black Creeks to the Yazoo River near Eden, Mississippi. Flows from the hill watersheds of these streams will be confined to a floodway formed by the hills on the east and a levee on the west. The levee ties to the hills on the north side of Abiaca Creek and extends southerly and generally parallel to the hill line, a distance of about 29 miles, to a junction with the authorized east bank levee of Yazoo River near the mouth of Techeva Creek. A pilot channel will be provided for low-water flows in the floodway.

Effects of Proposed Plan for Improvement and Development of Area:

There will be complete protection from floodwaters and sediment damages from Hill tributaries in the B Zone and partial protection from Yazoo backwater with planned works of improvement.

This protection and works of improvement in the area will provide adequate outlets for farm and group drainage systems, increase the level of management and extend the development of wooded areas for row crops and pasture.

Land Use:

At present approximately 49 percent of the entire project area is open land, 50 percent is woodland and 1 percent is water area. Most of the woodland is found in soil mapping unit 1.

There is some land clearing going on in the project area at present and is expected to continue in the future. This has been brought about by prior works of improvement such as the construction of reservoirs, channel realignment and improvement. It is estimated that 18,593 acres of woodland will be cleared in the future without the project in the A and B Zones. With the project in effect approximately 12,854 acres of additional woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping units 1 and 6. These are the soils that will benefit most from additional and improved drainage facilities.

Approximately 7 percent of the woodland in the project area is dedicated to forest use. Most of the dedicated woodland belongs to hunting clubs and hardwood lumber companies. Approximately 90 percent of the dedicated woodland is under a high level management.

The non-dedicated woodland is in fairly good condition. Timber cutting has been conservative with the result that some good stands remain in the area. The growth rates are above average. There has been some damage to woodland due to fires in 1952-1954. Approximately 2,000 acres of woodland has been damaged or killed because of flooding due to the diversion of water from Abiacha Creek into Mathews Brake.

Farm Drainage Systems and Cost:

Estimates of the amounts and cost of farm drainage systems by soil mapping units, that will be constructed after satisfactory group drainage systems, adequate major outlets, and adequate levee protection from Bluff streams are developed, are contained in Table VII. These estimates anticipate that 10 percent of the wet lands will be used for homesteads, roads, etc. In Zone A it is estimated that 79 percent of the gross open wet lands are already drained or will be drained without the project. It is estimated that an additional 16 percent will be drained due to the project and used for crops and pasture production. The remaining 5 percent will remain wet land due to lack of farmer participation. In the B Zone it is estimated that approximately 66 percent of the gross open wet land is presently drained or will be drained without the aid of the project. Of the remaining land it is estimated that approximately 88 percent will be drained and used for crop and pasture production. The remaining 12 percent will remain wet land due to lack of farmer participation.

Cost includes the installation (engineering, construction and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements vary by soil mapping units and land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Cost includes all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates are based on standard design data for conditions involved.

Farm drainage systems capital cost have been amortized for a useful life period of 10 years at 5 percent. The life expectancy of farm drainage systems is influenced by soil units, cropping patterns, which are largely determined by soil units, and the stability of the agriculture in the study area. It is anticipated that the life expectancy will be 10 years. Maintenance cost, varying with soil mapping units and land use, have been added to the amortized annual equivalent of installation cost to derive the total annual cost for farm drainage systems. Present cost of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost was established on a project wide basis. Any group facilities running through the C Zone were for the purpose of tying in Zone A and B with the major drainage outlet proposed in the project.

Approximately 150 miles of group drainage facilities are now in place and will require cleanout and maintenance to provide adequate group drainage for farm drainage systems now existing and anticipated without the proposed project works of improvement.

Channel enlargement on approximately 23 miles of ditches and 37 miles of new ditches will be required to give adequate group drainage facilities for farm drainage systems anticipated with the proposed works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structures. Installation cost has been amortized for a useful life period of 20 years at 3½ percent. This useful life is based on the known life of comparable ditches in this vicinity. Maintenance cost has been added to this amount to derive the total annual cost of group drainage systems. Present group drainage systems are expected to prevail under future with project conditions.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project consists of increased production resulting from improvements in farm and group drainage systems made possible by the project as well as improved management and better use of technical advancement under conditions of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting from better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes--- (1) net annual return and benefits from Table V; (2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag used was 20 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual installation and maintenance costs of farm drainage systems have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 15 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 10 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of group drainage systems have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 10 years, and (3) periof of analysis 50 years.

The lags described are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress towards realization of full benefits

from proposed project works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 10 years from the last year of project installation.

2. Land conversions and the complete installation of farm drainage systems is expected to occur 5 years after installation of group drainage systems or 15 years after project installation.

3. Realization of maximum estimated yields and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed or a total of 20 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of lag, and to level off at the end of the project life of 50 years.

Summary

The installation of authorized and planned works of improvement will provide protection from floodwater on approximately 89,000 acres of land. In addition to protection from floodwater, adequate outlets for farm and group drainage facilities will be provided on approximately 30,000 acres of additional land within the project.

It is anticipated that as a result of works of improvement the areas subject to flooding will be reduced materially and that agricultural development will proceed at a fairly rapid rate.

As a result of agricultural development within the project due to increased drainage facilities, there will be an annual gross benefit of $321,626; an annual associated cost of $179,107; with an annual net benefit to project of $142,519.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

TABLE I
Existing Land Use by Soil Mapping Units

Zone A - Drainage Calculations Only

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
1	11,754	9,042	20,796
4	8,756	398	9,154
4S	18,551	2,405	20,956
6	9,064	5,738	14,802
6S	18,305	2,494	20,799
7	1,150	0	1,150
8U	700	290	990
14		1,123	1,123
Subtotal-all soils	68,280	21,490	89,770

Zone B - Drainage and Flood Control Calculations

1	7,977	57,063	65,040
4	580	120	700
4S	2,741	697	3,438
6	1,592	245	1,837
6S	3,936	2,802	6,738
7	3,522	470	3,992
8	1,954	1,446	3,400
13U	828	250	1,078
14	0	2,837	2,837
Water			400
Subtotal-all soils	23,130	65,930	89,460

Zone C - Zone of no Project Benefit

1	0	5,160	5,160
14	0	700	700
Water			640
Subtotal-all soils	0	5,860	6,500
Total-All Zones	91,410	93,280	184,690
Water			1,040
Grand Total			185,730

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY
TABLE II A
ZONE FOR DRAINAGE CALCULATIONS ONLY
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	26,985			
	Crops	24,286			
	Cotton	7,397	Lbs. Lint	383	2,830,175
	Corn	4,072	Bu.	24	99,697
	Soybeans	7,745	Bu.	14	107,604
	Soybeans(Fol.oats)	(1,188)	Bu.	8	8,981
	Small Grains	1,828	Bu.	25	46,165
	Small Grains(Grazed)	-			
	Idle	486			
	Pasture	2,758	Lbs. Beef	148	408,680
	Other 1/	2,699			
	Forest Land	20,177			
	Total	47,162			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY - TABLE III A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	11,301						5/		
	Crops	10,171				4/				
	Cotton	4,388	Lbs.Lint	391	1,717,140	0.318286	546,541	106.29	466,408	80,133
	Corn	1,118	Bu.	29	32,032	1.45	47,145	27.83	31,109	16,036
	Soybeans	1,777	Bu.	18	32,289	2.35	75,881	24.33	43,242	32,639
	Soybeans(Fol.oats)	(1,061)	Bu.	10	10,847	2.35	25,490	24.02	18,571	6,919
	Small Grains	1,329	Bu.	27	35,860	0.95	34,067	20.40	27,113	6,954
	Small Grains(Grazed)	-								
	Idle	202				6/				
	Pasture	1,357	Lbs.Beef	145	196,320	0.1805	35,436	13.28	18,022	17,414
	Other 1/	1,130								
	Forest Land	2,672				10.71	28,617	5.95	15,899	12,718
	Total	13,973					793,177		620,364	172,813

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price of lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total does not include 11,245 acres of land that will remain in woods and swamps and 64,552 acres of land that is already drained or will be drained without the project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississipri

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	13,973						5/		
	Crops	12,576				4/				
	Cotton	5,176	Lbs.Lint	597	3,091,670	0.318286	984,033	153.80	790,885	193,148
	Corn	1,204	Bu.	41	49,576	1.45	71,885	37.38	45,469	26,416
	Soybeans	2,410	Bu.	28	67,705	2.35	159,109	36.05	86,882	72,227
	Soybeans(Fol.oats)	(1,282)	Bu.	17	21,680	2.35	50,948	28.05	35,966	14,982
	Small Grains	1,950	Bu.	45	87,444	0.95	83,072	29.44	57,400	25,672
	Small Grains(Grazed)	-								
	Idle	252				6/				
	Pasture	1,584	Lbs.Beef	262	415,280	0.1805	74,957	24.56	38,909	36,048
	Other 1/	1,397								
	Total	13,973					1,424,004		1,055,511	368,493

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total does not include 11,245 acres of land that will remain in woods and swamps and 64,552 acres of land that is already drained or will be drained without the project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) (5) Production Unit	Per Acre	(6) Total
		2/		3/	
All	Open Land	23,130			
	Crops	20,817			
	Cotton	4,013	Lbs.Lint	438	1,758,650
	Corn	2,209	Bu.	29	64,634
	Soybeans	8,802	Bu.	16	139,722
	Soybeans(Fol.oats)	(948)	Bu.	10	9,245
	Small Grains	1,665	Bu.	31	52,076
	Small Grains(Grazed)	-	Bu.		
	Idle	417			
	Pasture	3,711	Lbs.Beef	162	602,040
	Other 1/	2,313			
	Forest Land	57,193			
	Total	80,323			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Per Acre	(6) Total	(7) Value of Production Per Unit	(8) Total	(9) Cost of Production Per Acre	(10) Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	35,133						5/		
	Crops	31,619				4/				
	Cotton	10,335	Lbs. Lint	544	5,626,230	0.318286	1,790,751	140.19	1,448,880	341,871
	Corn	4,045	Bu.	36	147,290	1.45	213,571	34.52	139,622	73,949
	Soybeans	9,503	Bu.	21	197,021	2.35	463,000	30.00	285,101	177,899
	Soybeans(Fol.oats)	(1,528)	Bu.	12	17 929	2.35	42,134	22.98	34,547	7,587
	Small Grains	2,115	Bu.	35	72,974	0.95	69,325	26.16	51,200	18,125
	Small Grains(Grazed)	-								
	Idle	632				6/				
	Pasture	4,989	Lbs.Beef	204	1,018,440	0.1805	183,829	19.16	95,602	88,227
	Other 1/	3,514								
	Forest Land	9,199				9.77	89,874	6.10	56,115	33,759
	Total	44,332					2,852,484		2,111,067	741,417

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price of lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 44,728 acres of land that will remain in woodland and swamps and 400 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	44,332						5/		
	Crops	39,898				4/				
	Cotton	14,778	Lbs.Lint	569	8,406,440	0.318286	2,675,652	146.76	2,168,781	506,871
	Corn	4,379	Bu.	41	179,212	1.45	259,857	38.01	166,427	93,430
	Soybeans	12,903	Bu.	25	324,736	2.35	763,129	34.18	440,976	322,153
	Soybeans(Fol.oats)	(1,095)	Bu.	16	17,361	2.35	40,798	27.26	29,853	10,945
	Small Grains	1,546	Bu.	42	64,298	0.95	61,084	27.79	42,961	18,123
	Small Grains(Grazed)	-								
	Idle	797				6/				
	Pasture	5,495	Lbs.Beef	236	1,296,880	0.1805	234,086	22.23	122,180	111,906
	Other 1/	4,434								
		7/								
	Total	44,332					4,034,606		2,971,178	1,063,428

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 44,728 acres of land that will remain in woodland and swamps and 400 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach. Hillside Floodway
State: Mississippi

SUMMARY - TABLE II C
(Zone of No Project Benefit)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
All	Open Land	0			
	Crops				
	Cotton				
	Corn				
	Soybeans				
	Soybeans(Fol.oats)				
	Small Grains				
	Small Grains(Grazed)				
	Idle				
	Pasture				
	Other 1/				
	Forest Land	0			
	Total	0 2/			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Total does not include 5,860 acres of land that will remain in woodland and swamps and 640 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

SUMMARY - TABLE III C
(Zone of no Project Benefit) 2/
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) (5) (6) Production			(7) (8) Value of Production		(9) (10) Cost of Production		(11) Net Return
			Unit	Per Acre	Total	Per Unit	Total	Per Acre	Total	
		2/				Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	0								
	Crops									
	Cotton									
	Corn									
	Soybeans									
	Soybeans(Fol.oats)									
	Small Grains									
	Small Grains(Grazed)									
	Idle									
	Pasture									
	Other 1/									
	Forest Land	0								
		3/								
	Total	0								

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Data is same for both "With project" and "Without project" conditions; no Table IV C required.
3/ Total does not include 5,860 acres of land that will remain in woodland and swamps and 640 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(4) Future Without Project (Production in Dollars) Gross	(4) Cost	(5) Net	(6) Future With Project (Production in Dollars) Gross	(7) Cost	(8) Net	(9) Difference In Net Value
Zone A								
1	4,642	165,835	144,768	21,067	392,234	294,841	97,393	76,326
4	321	41,409	32,004	9,405	65,731	47,630	18,101	8,696
4S	590	74,159	55,043	19,116	110,110	80,050	30,060	10,944
6	4,054	142,734	110,231	32,503	363,848	260,984	102,864	70,361
6S	4,121	360,025	272,185	87,840	473,029	359,284	113,745	25,905
7	55	4,330	3,103	1,227	8,717	6,287	2,430	1,203
8U	190	4,685	3,030	1,655	10,335	6,435	3,900	2,245
1/ Sub-total	13,973	793,177	622,364	172,813	1,424,004	1,055,511	368,493	195,680
Aone B & C								
1	26,396	1,017,607	788,552	229,055	1,996,538	1,499,814	496,724	267,669
4S	3,516	547,729	386,796	160,933	560,472	395,074	165,398	4,465
6	1,677	141,752	107,303	34,449	152,461	110,600	41,861	7,412
6S	5,505	502,071	365,816	136,255	565,135	415,659	149,476	13,221
7	3,741	448,093	317,077	131,016	474,854	331,840	143,014	11,998
8	2,619	184,202	140,517	43,685	265,092	207,239	57,853	14,168
13	878	11,030	5,006	6,024	20,054	10,952	9,102	3,078
2/ Sub-total	44,332	2,852,484	2,111,067	741,417	4,034,606	2,971,178	1,063,428	322,011
TOTAL	58,305	3,645,661	2,731,431	914,230	5,458,610	4,026,689	1,431,921	517,691

1/Total area of A Zone does not include 75,797 acres of land that will not be benefited due to the project.
2/Total area of B and C Zones does not include 50,588 acres that will remain in woodland and 1,040 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

TABLE VI

LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total Cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55.00	12.50	xx	xx	67.50
W to IC	xx	-	-	xx		
W to P	xx	55.00	5.00	43	xx	103.00
P to GC	xx	xx	5.00	xx	xx	5.00
P to IC	xx	xx		xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx	43		43.00
Total per acre	xx					
Project						
W to GC	9,674	532,070	120,925	xx	xx	652,995
W to IC	0	0		xx		0
W to P	1,011	55,605	5,055	43,473	xx	104,133
P to GC	305	xx	1,525	xx	xx	1,525
P to IC	0	xx		xx		
GC to IC	0	xx	xx	xx		
GC to P	27	xx	xx	1,161		1,161
Total project	xx					759,814
Annual amortized value 2/	xx	xx	xx	xx	xx	41,623
Annual maintenance	xx	xx	xx	9.02	xx	9,363
Total annual cost of conversions	xx	xx	xx	xx	xx	50,986

1/ W--woodland; GC--general dry-farmed crops; IC-irrigated crops (rice); P--pasture.
2/ Amortized over 50-year period at 5 percent (.05478).

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost 2/ installation	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	1 General Crops	3,426	63,912	8,277	7,374	15,651
	1 Pasture	752	7,870	1,019	182	1,201
	4 General Crops	289	3,757	487	434	921
	4S General Crops	525	6,825	884	788	1,672
	4S Pasture	6	32	4	1	5
	6 General Crops	3,547	48,878	6,330	7,520	13,850
	6 Pasture	102	1,074	139	83	222
	6S General Crops	3,650	50,297	6,513	7,738	14,251
	6S Pasture	59	622	81	48	129
	7 General Crops	50	812	105	94	199
	8 General Crops	141	2,290	297	264	561
	8 Pasture	30	442	57	17	74
	Subtotal	12,577	186,811	24,193	24,543	48,736
B	1 General Crops	10,675	199,142	25,789	22,978	48,767
	1 Pasture	1,056	11,051	1,431	255	1,686
	4S General Crops	85	1,105	143	128	271

(Continued on next page)

Table VII Continued

Zone	Soil Mapping unit and land use	Area 1/	Total cost installation 2/	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
	6 General Crops	293	4,038	523	621	1,144
	6 Pasture	34	358	46	28	74
	6S General Crops	909	12,526	1,622	1,927	3,549
	6S Pasture	58	611	79	47	126
	7 General Crops	372	6,045	783	698	1,481
	7 Pasture	15	221	29	8	37
	8 General Crops	630	10,238	1,325	1,181	2,506
	8 Pasture	24	353	46	14	60
	Subtotal	14,151	245,688	31,816	27,885	59,701
	TOTAL	26,728	432,499	56,009	52,428	108,437

1/ Does not include 10% other lands.
2/ Includes engineering and contingency costs.
3/ Amortized @ 5% over 10 years. Amortization factor is .12950.

Basin: Yazoo
Project: Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu.Yd.	1,527,787	.15	229,168
Spreading Spoil	Cu.Yd.	221,163	.03	6,635
Clearing right-of-way	Ac.	427	75.00	32,025
Right-of-way easements	Ac.	2,165	97.06	210,125
Crossings	Ft.	581	40.00	23,240
Clearing and Snagging	Ac.	347	297.69	103,300
Total construction cost	xx	xx	xx	604,494
Engineering cost	xx	xx	xx	60,449
Contingencies and legal	xx	xx	xx	60,449
Total installation cost				725,392
Annual equivalent - installation cost (amortized for 20 years at 3½ percent)				51,039
Annual maintenance cost				30,225
Total annual cost of required group facilities				81,264

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project; Yazoo Headwater
Reach: Hillside Floodway
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS
AND ASSOCIATED COSTS

(1) Item	(2) Total	(3) Discounted amount
	Dollars	Dollars
1. Net return with project	1,431,921	
2. Net return without project	914,230	
3. Gross benefit to project	517,691	321,626 1/
4. Farm drainage cost		
a. Installation cost	56,009	
b. Maintenance cost	52,428	
c. Total	108,437	75,931 2/
5. Group drainage cost		
a. Installa tion cost	51,039	
b. Maintenance cost	30,225	
c. Total	81,264	67,476 3/
6. Conversion cost		
a. Installation cost	41,623	
b. Maintenance cost	9,363	
c. Total	50,986	35,700 2/

1/ Discount factor for 20 years @ 5% - .62127
2/ Discount factor for 15 years @ 5% - .70023
3/ Discount factor for 10 years @ 3½%- .83033



LOCATION MAP

YAZOO HEADWATER PROJECT

HILLSIDE FLOODWAY AREA

MISSISSIPPI

SCALE 1:500,000

LEGEND

LEVEES

HILL LINE AND AREA BOUNDARY

RIVERS, STREAMS

COUNTY LINE

II. PELUCIA CREEK

Description of Area

Pelucia Creek is located in Carroll and Leflore Counties and lies between the Bluff Hills on the east and the Yazoo River on the west. It comprises 33,060 acres of which 20,450 is above the limits of maximum overflow (A Zone); 9,820 is between the limits of maximum overflow and the three-year frequency overflow with project in operation; 2,790 acres is in the floodway and below the three-year frequency with project in operation. Twenty-five thousand Eight hundred twenty (25,820) acres are open and 7,240 acres are in woods.

Soils and Topography:

Within the A Zone approximately 10 percent of the soils are level, very poorly drained heavy clays; 56 percent are somewhat poorly drained silt loams and clay loams on level to gentle slopes; 30 percent are well drained silt loam and sandy loam soils on nearly level to gentle slopes; 2 percent are permeable, excessively drained sands and 2 percent in swamps.

Within the B Zone approximately 23 percent of the soils are level, very poorly drained heavy clays; 36 percent are somewhat poorly drained silt loams and clay loams on level to gentle slopes; 25 percent are well drained silt loam and sandy loam soils on level to gentle slopes and 16 percent in swamps and water area.

Approximately 55 percent of the C Zone is in the leveed floodway, 25 percent in poorly drained clay soils and 20 percent in gently sloping sandy loam soils.

Problems Within the Project

Most of the problems in the project are directly related to the characteristics of the upland portion of the watershed. Steep slopes, adverse hydrologic soil conditions, poor cover and somewhat impervious soils are conducive to high runoff. The loess soil is extremely erosive and in many places gullies have penetrated into the underlying Coastal Plain material. High runoff plus erosive soil conditions has caused considerable floodwater and sediment damages in the alluvial floodplain. Even though the floodway is leveed, there are storms of sufficient magnitude to cause frequent failures to the levee system.

The risk of damage to land from levee failures has resulted in an inadequate farm and group drainage system for lands near the floodway. The level of management and development within the area is not equal to similar areas with full protection.

Existing Works of Improvement

The existing works of improvement within the area consist of channel improvement from the confluence of Pelucia Creek and the Yazoo River

to a point approximately three miles up Pelucia Creek. The Pelucia Drainage District has constructed a leveed floodway to the upstream point of the present works of improvement.

Proposed Plan of Improvement

The character of the proposed project through the delta area consists of enlargement of the existing floodway along the present alignment of Pelucia Creek. The south levee will be extended along the south bank of Pelucia Creek to a junction with the authorized Yazoo River levee.

Effects of Proposed Plan for Improvement and Development of Area:

The proposed plan will provide protection to the B Zone from floodwaters and sediment that originate in the upland portion of the watershed.

It will also provide adequate outlets for farm and group drainage systems, increase the level of management and extend the development of woodlands for row crops and pasture.

Land Use:

At present approximately 76 percent of the entire project area is open land, 23 percent is woodland and 1 percent is water area.

A small amount of land clearing is going on in the project area at present and this trend is expected to continue. It is estimated that 984 acres of woodland will be cleared in the future without the project in the A and B Zones. With the project in effect approximately 1,899 additional acres of woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping units 1 and 8. These are the soils within the project area that will benefit most from additional and improved drainage facilities.

There is no woodland in the project area that is dedicated to woodland.

The woodland, with the exception of several hundred acres that is under a moderate level of management, is in a depleted condition on account of liquidation of sawlog sized material. Less than one-third of the area supports sawlog size stands but species composition is good. There has been some damage in the past from fires, grazing and silting. Under a level of good management, yields are relatively high despite these unfavorable conditions.

Farm Drainage Systems and Cost:

Tables VII contains estimates of amounts and cost of farm drainage systems by soil mapping units that can be expected to be constructed after satisfactory group drainage systems and adequate levee protection are provided. These estimates anticipate that 10 percent of the wet lands will be used for roads, farmsteads, etc. In Zone B it is estimated that 58 percent of the gross open land is presently drained or

will be drained without the project. Of the remaining land it is estimated that 90 percent will be drained and used for crop and pasture production. The remaining 10 percent will remain wet lands due to lack of farmer participation. In the A Zone it is estimated that 79 percent of the open land is presently drained or will be drained without the project. It is estimated that 86 percent of the remaining land will be drained and used for crop and pasture production. The remaining 14 percent will remain wet lands due to lack of farmer participation.

Cost includes the installation (construction, engineering and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements vary by soil mapping units and land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Cost includes all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates are based on standard design data for conditions involved.

Farm drainage systems capital cost have been amortized for a useful life period of 10 years at 5 percent. The life expectancy of farm drainage systems is influenced by soil units, cropping patterns, which are largely determined by soil units, and the stability of the agriculture in the study area. It is anticipated that the life expectancy will be 10 years. Maintenance cost, varying with soil mapping units and land use, have been added to the amortized annual equivalent of installation cost to derive the total annual cost for farm drainage systems. Present cost of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost was established on a project wide basis. Any group drainage running through the floodway were for the purpose of tying Zone A and B with the major outlet. It was recognized that all drainage could have been completed without the project, but the inadequate levee protection causes too great a hazard for farm and group drainage to be completed.

Approximately 44 miles of ditches are now in place and will require maintenance only to furnish adequate drainage for farm drainage now existing and anticipated without proposed works of improvement.

Channel enlargement on approximately 13 miles of old ditches, lowering the ditch gradient of approximately 30 miles, and the construction of 1 mile of new ditches will be required to provide adequate group facilities for farm drainage systems anticipated with the proposed works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structure. Installation costs have been amortized for the useful life period of 20 years at $3\frac{1}{2}$ percent. This useful life is based on known life of comparable ditches in the immediate vicinity. Maintenance costs have been added to this amount to derive a total annual cost of group drainage

systems. Present group drainage systems are expected to prevail under future with project conditions.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project works of improvement will be improvements in farm and group drainage systems and improved management and better use of technological advancement as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting in better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual returns and benefits from Table V; (2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag used was 15 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual installation and maintenance costs of farm drainage have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 10 years, (3) average life of measure 10 years, and (4) period of analysis 50 years.

Annual installation and maintenance cost of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 10 years, and (3) period of analysis 50 years.

Annual value of group drainage installation and maintenance costs have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 5 years, (3) life of measure 20 years, and (4) period of analysis 50 years.

The lags described are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress towards realization of full benefits from proposed works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 5 years from the last year of project installation.

2. Land conversions and the complete installation of farm drainage is expected to take 5 years after installation of group drainage systems, or 10 years after project installation.

3. Realization of maximum estimated yields and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed, or a total of 15 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of lag, and to level off at the end of the period of lag and continue at a constant rate to the end of the project life of 50 years.

Summary

The installation of planned works of improvement will provide full protection on 9,642 acres of land in the B Zone. Elimination of the flooding hazard due to levee breaks is expected to result in the construction of additional group drainage facilities that will provide farm drainage on 6,840 acres of land in the A and B Zones.

As a result of agricultural development within the project due to drainage facilities, there will be an annual gross benefit of $64,752; annual associated costs of $45,061; with an annual net benefit to project of $19,691.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

TABLE I

Existing Land Use By Soil Mapping Units

Zone A - Drainage Calculations

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
1	970	1,075	2,045
4	2,536	248	2,784
6	7,278	748	8,026
7	3,120	173	3,293
8	2,144	1,281	3,425
13	319	118	437
14		440	440
Subtotal - All Soils	16,367	4,083	20,450
Water	-	-	-
Total - Zone A	16,367	4,083	20,450

Zone B - Drainage and Flood Control Calculations

1	2,031	235	2,266
4	258	-	258
6	1,881	225	2,106
7	2,000	141	2,141
8	610	828	1,438
13	30	50	80
14	-	1,353	1,353
Subtotal-All Soils	6,810	2,832	9,642
Water	-	-	178
Total - Zone B	6,810	2,832	9,820
Total - All Soils	23,177	6,915	30,092
Water			178
Total - Project	23,177	6,915	30,270

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE II A
ZONE FOR DRAINAGE CALCULATIONS ONLY
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	5,772			
	Crops	5,195			
	Cotton	972	Lbs.Lint	336	326,890
	Corn	715	Bu.	21	14,804
	Soybeans	1,352	Bu.	15	19,823
	Soybeans(Fol.oats)	(425)	Bu.	9	3,736
	Small Grains	648	Bu.	29	18,517
	Idle	103			
	Pasture	1,405	Lbs. Beef	153	215,270
	Other 1/	577			
	Forest Land	3,965			
		4/			
	Total	9,737			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 10,713 acres of land that is already drained or does not need drainage.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE III A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	3,046						5/		
	Crops	2,741				4/				
	Cotton	525	Lbs.Lint	384	201,570	0.318286	64,156	104.94	55,094	9,062
	Corn	370	Bu.	27	9,972	1.45	14,459	26.62	9,850	4,609
	Soybeans	618	Bu.	18	11,318	2.35	26,597	24.50	15,141	11,456
	Soybeans(Fol.oats)	(213)	Bu.	12	2,603	2.35	6,118	24.00	5,112	1,006
	Small Grains	313	Bu.	34	10,494	0.95	9,969	23.57	7,378	2,591
	Idle	54				6/				
	Pasture	861	Lbs.Beef	187	160,870	0.1805	29,038	17.92	15,433	13,605
	Other 1/	305								
	Forest Land	911				14.34	13,065	7.64	6,959	6,105
	Total	7/ 3,957					163,401		114,967	48,434

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total does not include 16,493 acres of land that is already drained or will not be drained due to the project.

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars 5/	Dollars	Dollars
All	Open Land	3,957								
	Crops	3,561				4/				
	Cotton	935	Lbs.Lint	583	544,990	0.318286	173,463	149.64	139,917	33,546
	Corn	478	Bu.	47	22,632	1.45	32,817	43.45	20,768	12,049
	Soybeans	557	Bu.	27	14,971	2.35	35,181	32.46	18,078	17,103
	Soybeans (Fol.oats)	(294)	Bu.	16	4,847	2.35	11,391	25.51	7,500	3,891
	Small Grains	407	Bu.	44	17,926	0.95	17,029	29.03	11,817	5.212
	Idle	71				6/				
	Pasture	1,113	Lbs.Beef	273	304,330	0.1805	54,932	25.43	28,302	26,630
	Other 1/	396								
	Total	3,957					324,813		226,382	98,431

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; roundedto nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 16,492 acres of land that is already drained or will not be drained due to the project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE II B
ZONE FOR DRAINAGE AND FLOOD CONTROL CALCULATIONS
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Per Acre	(6) Total
		2/		3/	
All	Open Land	6,810			
	Crops	6,129			
	Cotton	1,755	Lbs.Lint	413	725,270
	Corn	740	Bu.	22	16,380
	Soybeans	1,383	Bu.	19	26,717
	Soybeans(Fol.oats)	(653)	Bu.	11	7,364
	Small Grains	778	Bu.	34	26,784
	Idle	124			
	Pasture	1,349	Lbs.Beef	186	251,440
	Other 1/	681			
	Forest Land	2,832			
	Total	9,642			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 178 acres remaining in water area.

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT: (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	6,990						5/		
	Crops	6,291				4/				
	Cotton	2,043	Lbs.Lint	530	1,082,820	0.318286	344,647	138.28	282,500	62,147
	Corn	674	Bu.	42	28,134	1.45	40,794	39.61	26,694	14,100
	Soybeans	1,238	Bu.	25	31,480	2.35	73,977	32.30	39,990	33,987
	Soybeans (Fol.oats)	(571)	Bu.	16	9,010	2.35	21,173	25.85	14,758	6,415
	Small Grains	766	Bu.	39	29,584	0.95	28,105	26.29	20,137	7,968
	Idle	127				6/				
	Pasture	1,443	Lbs. Beef	215	310,100	0.1805	55,973	20.37	29,398	26,575
	Other 1/	699								
	Forest Land	737				11.40	8,402	6.99	5,152	3,250
		7/								
	Total	7,727					573,071		418,629	154,442

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 2,093 acres that will remain in woods and water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Production Costs Per Acre	(10) Production Costs Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars 5/	Dollars	Dollars
All	Open Land	7,727								
	Crops	6,954				4/				
	Cotton	2,224	Lbs. Lint	591	1,314,940	0.318286	418,527	150.96	335,741	82,786
	Corn	751	Bu.	46	34,706	1.45	50,324	42.67	32,044	18,280
	Soybeans	1,413	Bu.	27	37,473	2.35	88,061	33.01	46,642	41,419
	Soybeans (Fol.oats)	(605)	Bu.	16	9,934	2.35	23,344	26.55	16,060	7,284
	Small Grains	811	Bu.	44	35,652	0.95	33,370	28.99	23,511	10,359
	Idle	140				6/				
	Pasture	1,615	Lbs.Beef	262	422,730	0.1805	76,302	24.47	39,512	36,790
	Other 1/	773								
		7/								
	Total	7,727					690,428		493,510	196,918

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 2,093 acres that will remain in woods and water area.

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) Future Without Project (Production in Dollars) Gross	(4) Cost	(5) Net	(6) Future With Project (Production in Dollars) Gross	(7) Cost	(8) Net	(9) Difference IN NET Value
Zone A								
1	786	18,480	13,433	5,047	61,397	45,497	15,900	10,853
4	114	4,130	2,665	1,465	14,125	9,696	4,429	2,964
6	1,936	95,232	67,442	27,790	160,430	111,270	49,160	21,370
7	401	25,955	18,175	7,780	40,710	27,106	13,604	5,824
8	720	19,604	13,252	6,352	48,151	32,813	15,338	8,986
1/ Sub-total	3,957	163,401	114,967	48,434	324,813	226,382	98,431	49,997
Zone B								
1	2,165	112,025	89,018	23,007	157,396	116,750	40,646	17,639
4	258	31,324	21,542	9,782	31,980	21,938	10,042	260
6	2,019	151,794	111,774	40,020	172,349	126,120	46,229	6,209
7	2,100	231,274	163,690	67,584	246,566	171,412	75,154	7,570
8	1,155	46,279	32,438	13,841	81,762	57,123	24,639	10,798
13	30	374	167	208	375	167	208	0
2/ Sub-total	7,727	573,071	418,629	154,442	690,428	493,510	196,918	42,476
TOTAL	11,684	736,472	533,596	202,876	1,015,241	719,892	295,349	92,473

1/Total area of Zone A reduced by 16,493 acres not anticipated to receive drainage benefits from project.
2/Total area of Zone B reduced by 2,093 acres that will remain in woods and water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

TABLE VI

LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55	12.50	xx	xx	
W to IC	xx			xx		
W to P	xx	55	5.00	45	xx	
P to GC	xx	xx		xx	xx	
P to IC	xx	xx		xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx			
Total per acre	xx					
Project						
W to GC	1,059	58,245	13,238	xx	xx	71,483
W to IC				xx		
W to P	424	23,320	2,120	19,080	xx	44,520
P to GC		xx		xx	xx	
P to IC		xx		xx		
GC to IC		xx	xx	xx		
GC to P		xx	xx			
Total project	xx	81,565	15,358	19,080		116,003
Annual Amortized value 2/	xx	xx	xx	xx	xx	6,355
Annual maintenance	xx	xx	xx	9.38	xx	3,977
Total annual cost of conversions	xx	xx	xx	xx	xx	10,332

1/ W--woodland; GC--general dry-farmed crops; IC-irrigated crops (rice); P--pasture.
2/ Amortized over 50-year period at 5 percent (.05478).

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost installation 2/	Annual equivalent cost	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	1 General Crops	590	11,007	1,425	1,270	2,695
	1 Pasture	117	1,224	159	28	187
	4 General Crops	101	1,313	170	152	322
	4 Pasture	2	11	1	0	1
	6 General Crops	1,526	21,029	2,723	3,235	5,958
	6 Pasture	216	2,275	295	175	470
	7 General Crops	344	5,590	724	645	1,369
	7 Pasture	17	251	33	10	43
	8 General Crops	557	9,052	1,172	1,044	2,216
	8 Pasture	91	1,343	174	52	226
	Subtotal	3,561	53,095	6,876	6,611	13,487
B	1 General Crops	775	14,457	1,872	1,668	3,540
	1 Pasture	205	2,145	278	50	328
	4 General Crops	52	676	88	78	166
	4 Pasture	1	5	1	0	1
	6 General Crops	541	7,456	966	1,147	2,113
	6 Pasture	65	684	89	53	142

(Continued on next page)

TABLE VII Continued

Zone	Soil Mapping Unit and Land Use	Area 1/	Total cost 2/ installation	Annual equivalent cost	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
B	7 General Crops	434	7,053	913	814	1,727
	7 Pasture	12	177	23	7	30
	8 General Crops	472	7,670	993	885	1,878
	8 Pasture	38	560	73	22	95
	Subtotal	2,595	40,383	5,296	5,724	10,020
	TOTAL	6,156	93,978	12,172	11,335	23,507

1/ Does not include 10% other lands.
2/ Includes engineering and contingency.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu.Yd.	493,014	.15	73,952
Spreading Spoil	Cu.Yd.	62,162	.03	1,865
Clearing right-of-way	Ac.	9	75.00	675
Right-of-way easements	Ac.	252	100.00	25,200
Crossings	Ft.	245	40.00	9,800
Clearing and Snagging	Ac.	142	252.82	35,900
Total construction cost	xx	xx	xx	147,392
Engineering cost	xx	xx	xx	14,739
Contingencies and legal	xx	xx	xx	14,739
Total installation cost				176,870
Annual equivalent - installation cost (amortized for 20 years at 3½ percent)				12,445
Annual maintenance cost				7,370
Total annual cost of required group facilities				19,815

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Pelucia
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS
AND ASSOCIATED COSTS

(1) Item	(2) Total Dollars	(3) Discounted amount Dollars
1. Net return with project	295,349	
2. Net return without project	202,876	
3. Gross benefit to project	92,473	64,752 1/
4. Farm drainage cost		
a. Installation cost	12,172	
b. Maintenance cost	11,335	
c. Total	23,507	18,635 2/
5. Group drainage cost		
a. Installation cost	12,445	
b. Maintenance cost	7,370	
c. Total	19,815	18,235 3/
6. Conversion cost		
a. Installation cost	6,355	
b. Maintenance cost	3,977	
c. Total	10,332	8,191 2/

1/ Discount factor for 15 years @ 5% - .70023
2/ Discount factor for 10 years @ 5% - .79275
3/ Discount factor for 5 years @ 3¢% - .92028



LEGEND:

LIMITS OF STUDY AREA AND LEVEE

ZONE BOUNDARY "A" ZONE

RIVERS, STREAMS

COUNTY LINE

LOCATION MAP

YAZOO HEADWATER PROJECT

PELUCIA CREEK AREA

MISSISSIPPI

SCALE 1:62,500

III. BIG SAND CREEK

Description of Area

Big Sand Creek is located in Carroll and Leflore Counties and lies between the Yalobusha and Yazoo Rivers on the west and the Bluff Hills on the east. It comprises 16,430 acres of which 2,560 acres is above the limits of maximum overflow (A Zone); 12,980 acres is between the limits of overflow and the floodway, which comprises 890 acres. There is no area defined as below the three-year frequency with the project in operation.

Soils and Topography:

Within the A Zone approximately 59 percent of the soils are somewhat poorly drained and occur on nearly level to gentle slopes; the remaining 41 percent are well drained silt loams and occur on nearly level slopes.

There is a wide range of soil characteristics in the B Zone. Approximately 18 percent of the soils are very poorly drained heavy clays on nearly level slopes; 61 percent somewhat poorly drained silt loams and clay loams on nearly level slopes; 15 percent well drained silt loams on nearly level slopes and 6 percent sand deposits as a result of levee failures.

Problems Within the Project

Most of the problems in the project are directly related to the characteristics of the upland portion of the watershed. Steep slopes, adverse hydrologic soil conditions, poor cover and somewhat impervious soils are conducive to high runoff. The loess soil is extremely erosive and in many places gullies have penetrated into the underlying Coastal Plan material. High runoff plus erosive soil conditions has caused considerable floodwater and sediment damages in the alluvial floodplain. Even though the floodway is leveed there are storms of sufficient magnitude to cause frequent failures to the levee system.

The risk of damage to land from levee failures has resulted in an inadequate farm and group drainage system for lands near the floodway. The level of management and development within the area is not equal to similar areas with full protection.

Existing Works of Improvement

There are no works of improvement within the project boundaries. The Big Sand Drainage District confines the flow to a leveed floodway to a point near the Greenwood protection levee.

Proposed Plan of Improvement

The character of the proposed project consists of construction of a floodway along alignment of present channel from the Bluff Hills to

the downstream end of the existing desilting basin and along a new alignment west to its point of entry into the Yazoo River.

Effects of Proposed Plan for Improvement and Development of Area:

The proposed plan will provide protection to the B Zone from floodwaters and sediment that originate in the upland portion of the watershed.

It will also provide adequate outlets for farm and group drainage systems, increase the level of management and extend the development of woodlands for row crops and pasture.

Land Use:

At present approximately 72 percent of the entire project area is openland and 28 percent is woodland.

Some land clearing is going on in the project area at present and this trend is expected to continue. This has been brought about partially by prior works of improvement mainly the construction of Grenada Reservoir. It is estimated that 493 acres of woodland will be cleared in the future without the project. With the project in effect approximately 2,117 additional acres of woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping units 1 and 8. These are the soils that will benefit most from additional and improved drainage facilities.

There is no dedicated woodland in the project area.

Most of the woodland is in a generally poor condition due to past forest fires and poor cutting practice. In some areas most of the saw timber volume has been killed. There is some evidence of damage to timber due to silting.

Farm Drainage Systems and Costs:

Table VII contains estimates of amounts and cost of farm drainage systems by soil mapping units that can be expected to be constructed after satisfactory group drainage systems and adequate levee protection are provided. These estimates anticipate that 10 percent of the wet land will be used for roads, farmsteads, etc. In Zone B it is estimated that 59 percent of the gross open land is presently drained or will be drained without the project. Of the remaining land it is estimated that 78 percent will be drained and used for crop and pasture production. The remaining 22 percent will remain wet due to lack of farmer participation. In the A Zone it is estimated that 77 percent of the gross open land is presently drained or will be drained without the project. It is estimated that 85 percent of the remaining land will be drained and used for crop and pasture production. The remaining 14 percent will remain wet due to the lack of farmer participation.

Cost includes installation (construction, engineering and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements

vary by soil mapping units and land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Cost includes all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates are based on standard design data for conditions involved.

Farm drainage systems capital cost have been amortized for a useful life period of ten years at 5 percent. The life expectancy of farm drainage systems is influenced by soil units, cropping patterns, which are largely determined by soil units, and the stability of agriculture in the study area. It is determined that the life expectancy will be 10 years. Maintenance cost, varying with soil mapping units and land use, have been added to the amortized annual equivalent of installation cost to derive the total annual cost of farm drainage systems. Present cost of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost was established on a project-wide basis. Any group drainage ditch running through the floodway was for the purpose of tying-in Zone A and B with the major drainage outlets.

Approximately 26 miles of ditches are now in place and will require maintenance only to furnish adequate ditches for farm drainage systems now existing and anticipated without the proposed works of improvement in place.

Channel enlargement on approximately 16 miles of old ditches, lowering the gradient on approximately 11 miles of old ditches and constructing one mile of new ditches will be required to provide adequate group facilities for farm drainage systems anticipated with the proposed works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structures. Installation costs have been amortized for a useful life of 20 years at $3\frac{1}{2}$ percent. This useful life is based on the known life of comparative ditches in this immediate vicinity. Maintenance costs have been added to this amount to derive the total annual cost of group drainage. Present group drainage systems are expected to prevail under future with project conditions.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project works of improvement will be improvements in farm and group drainage systems, and improved management and better use of technological advancement as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting in better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual return and benefits from Table V;(2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag was 20 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual installation and maintenance costs of farm drainage have been discounted to take into account the following considerations; (1) interest rate 5%, (2) time lag 15 years, (3) life of measure 10 years, and (4) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 15 years, and (3) period of analysis 50 years.

Annual values of group drainage installation and maintenance costs have been discounted to take into account the following considerations: (1) interest rate 3½ percent, (2) time lag 10 years, (3) life of measure 20 years, and (4) period of analysis 50 years.

The lags described are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress toward realization of full benefits from proposed project works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 10 years from the last year of project installation.

2. Land conversions and the complete installation of farm drainage systems is expected to take 5 years after installation of group drainage or 15 years after project installation.

3. Realization of maximum estimated yield and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed or a total of 20 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of the lag, and to level off at the end of the period of lag and continue at a constant rate to the end of the project life of 50 years.

Summary

The installation of planned works of improvement will provide full

protection on 12,980 acres of land in the B Zone. In addition to protection from flooding, the project will be instrumental in causing group drainage to be constructed that will provide farm drainage on 5,021 acres of land in the A and B Zones.

As a result of agricultural development within the project due to increased drainage facilities, there will be an annual gross benefit of $52,602; annual associate cost of $32,261; with an annual net benefit of $20,341.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

TABLE I

Existing Land Use by Soil Mapping Units

Zone A - Drainage Calculations Only

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
6	942	40	982
7	859	200	1,059
8	369	150	519
Subtotal - All Soils	2,170	390	2,560

Zone B - Drainage and Flood Control Calculations

1	1,007	1,305	2,312
6	1,895	350	2,245
7	2,004	24	2,028
8	3,575	2,081	5,656
13	489	250	739
Subtotal - All Soils	8,970	4,010	12,980
Total - Project	11,140	4,400	15,540

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach Big Sand
State: Mississippi

SUMMARY - TABLE II A
(Zone for Drainage Calculations only)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	728			
	Crops	655			
	Cotton	119	Lbs. Lint	371	44,200
	Corn	54	Bu.	26	1,424
	Soybeans	220	Bu.	16	3,528
	Soybeans(Fol.oats)	(71)	Bu.	9	660
	Small Grains	91	Bu.	33	3,024
	Idle	14			
	Pasture	157	Lbs.Beef	170	26,680
	Other 1/	73			
	Forest Land	390			
	Total	1,118 4/			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 1,442 acres of land that has already been drained.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississipri

SUMMARY - TABLE III A
(Zone for drainage calculations only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	422						5/		
	Crops	380				4/				
	Cotton	94	Lbs. Lint	455	42,800	0.318286	13,622	119.89	11,270	2,352
	Corn	37	Bu.	36	1,348	1.45	1,954	32.00	1,184	770
	Soybeans	115	Bu.	22	2,564	2.35	6,025	27.50	3,163	2,862
	Soybeans (Fol.oats)	(27)	Bu.	14	374	2.35	879	20.78	561	318
	Small Grains	36	Bu.	42	1,520	0.95	1,444	28.11	1,012	432
	Idle	9				6/				
	Pasture	89	Lbs. Beef	188	16,730	0.1805	3,020	18.02	1,604	1,416
	Other 1/	42								
	Forest Land	85				7.64	650	4.31	366	284
		7/								
	Total	507					27,594		19,160	8,434

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 2,053 acres of land that is already drained, will be drained without the project, or will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars 5/	Dollars	Dollars
All	Open Land	507								
	Crops	456				4/				
	Cotton	209	Lbs.Lint	630	131,620	0.318286	41,892	158.62	33,096	8,796
	Corn	44	Bu.	56	2,444	1.45	3,544	48.27	2,124	1,420
	Soybeans	60	Bu.	30	1,772	2.35	4,164	35,55	2,133	2,031
	Soybeans (Fol.oats)	(41)	Bu.	18	758	2.35	1,781	29.98	1,229	552
	Small Grains	52	Bu.	47	2,448	0.95	2,325	30.57	1,590	735
	Idle	9				6/				
	Pasture	82	Lbs. Beef	267	21,900	0.1805	3,953	24.95	2,046	1,907
	Other 1/	51								
		7/								
	Total	507					57,659		42,218	15,441

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Does not include 2,053 acres of land that is already drained, will be drained without the project, or will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	8,970			
	Crops	8,072			
	Cotton	1,919	Lbs.Lint	418	801,700
	Corn	689	Bu.	26	17,763
	Soybeans	2,264	Bu.	20	45,024
	Soybeans (Fol.oats)	(445)	Bu.	13	5,851
	Small Grains	552	Bu.	38	21,252
	Idle	482			
	Pasture	2,166	Lbs. Beef	184	399,140
	Other 1/	898			
	Forest Land	4,010			
	Total	12,980			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	9,342						5/		
	Crops	8,408				4/				
	Cotton	3,009	Lbs.Lint	516	1,552,360	0.318286	494,095	135.10	406,517	87,578
	Corn	578	Bu.	44	25,460	1.45	36,917	40.75	23,554	13,363
	Soybeans	1,679	Bu.	26	43,135	2.35	101,366	32.46	54,508	46,858
	Soybeans (Fol.oats)	(540)	Bu.	18	9,695	2.35	22,783	29.27	15,807	6,976
	Small Grains	646	Bu.	47	30,216	0.95	28,705	30.41	19,647	9,058
	Idle	489				6/				
	Pasture	2,007	Lbs.Beef	218	438,030	0.1805	79,064	20.88	41,900	37,164
	Other 1/	934								
	Forest Land	2,006				7.64	15,326	4.31	8,647	6,679
		7/								
	Total	11,348					778,256		570,580	207,676

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 1,632 acres of land that will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	11,348						5/		
	Crops	10,214				4/				
	Cotton	3,652	Lbs.Lint	569	2,078,930	0.318286	661,694	146.43	534,751	126,943
	Corn	715	Bu.	47	33,264	1.45	48,233	42.75	30,566	17,667
	Soybeans	2,134	Bu.	28	59,639	2.35	140,152	34.19	72,957	67,195
	Soybeans (Fol.oats)	(594)	Bu.	19	11,038	2.35	25,940	29.86	17,734	8,206
	Small Grains	707	Bu.	48	33,692	0.95	32,005	30.76	21,748	10,260
	Idle	204				6/				
	Pasture	2,802	Lbs.Beef	225	631,060	0.1805	113,907	21.00	58,840	55,067
	Other 1/	1,134								
		7/								
	Total	11,348					1,021,934		736,596	285,338

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 1,632 acres of land that will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) (4) (5) Future Without Project (Production in Dollars) Gross	Cost	Net	(6) (7) (8) Future With Project (Production in Dollars) Gross	Cost	Net	(9) Difference In Net Value
Zone A								
6	198	14,919	10,549	4,370	24,741	19,064	5,677	1,307
7	175	9,260	6,235	3,025	22,643	15,877	6,766	3,741
8	134	3,415	2,376	1,039	10,275	7,277	2,998	1,959
1/ Subtotal	507	27,594	19,160	8,434	57,659	42,218	15,441	7,007
Zone B								
1	1,731	105,465	78,035	27,430	165,803	122,152	43,651	16,221
6	2,114	171,980	129,584	42,396	214,013	157,648	56,365	13,969
7	2,013	250,393	178,832	71,561	263,864	185,731	78,133	6,572
8	5,001	248,830	183,421	65,409	372,030	268,289	103,741	38,332
13	489	1,588	708	880	6,224	2,776	3,448	2,568
2/ Subtotal	11,348	778,256	570,580	207,676	1,021,934	736,596	285,338	77,662
Total	11,855	805,850	589.740	216,110	1,079,593	778,814	300,779	84,669

1/ Total area of Zone A reduced by 2,053 acres not anticipated to receive drainage benefits from project.
2/ Total area of Zone B reduced by 1,632 acres that will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

TABLE VI

LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of Smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55	12.50	xx	xx	67.50
W to IC	xx	-	-	xx		
W to P	xx	55	5	43	xx	103
P to GC	xx	xx	5	xx	xx	5
P to IC	xx	xx	-	xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx	17		17
Total per acre	xx					
Project						
W to GC	1,401	77,055	17,512	xx	xx	94,567
W to IC				xx		
W to P	481	26,455	2,405	20,683	xx	49,543
P to GC	12	xx	60	xx	xx	60
P to IC	-	xx		xx		
GC to IC	-	xx	xx	xx		
GC to P	321	xx	xx	5,457		5,457
Total project	xx	103,510	19,977	26,140		149,627
Annual amortized value 2/	xx	xx	xx	xx		8,197
Annual maintenance	xx	xx	xx	8.62	xx	6,913
Total annual cost of conversions	xx	xx	xx	xx	xx	15,110

1/ W--woodland; GC--general dry-farmed crops; IC--irrigated crops (rice); P--pasture.
2/ Amortized over 50-year period at 5 percent (.05478).

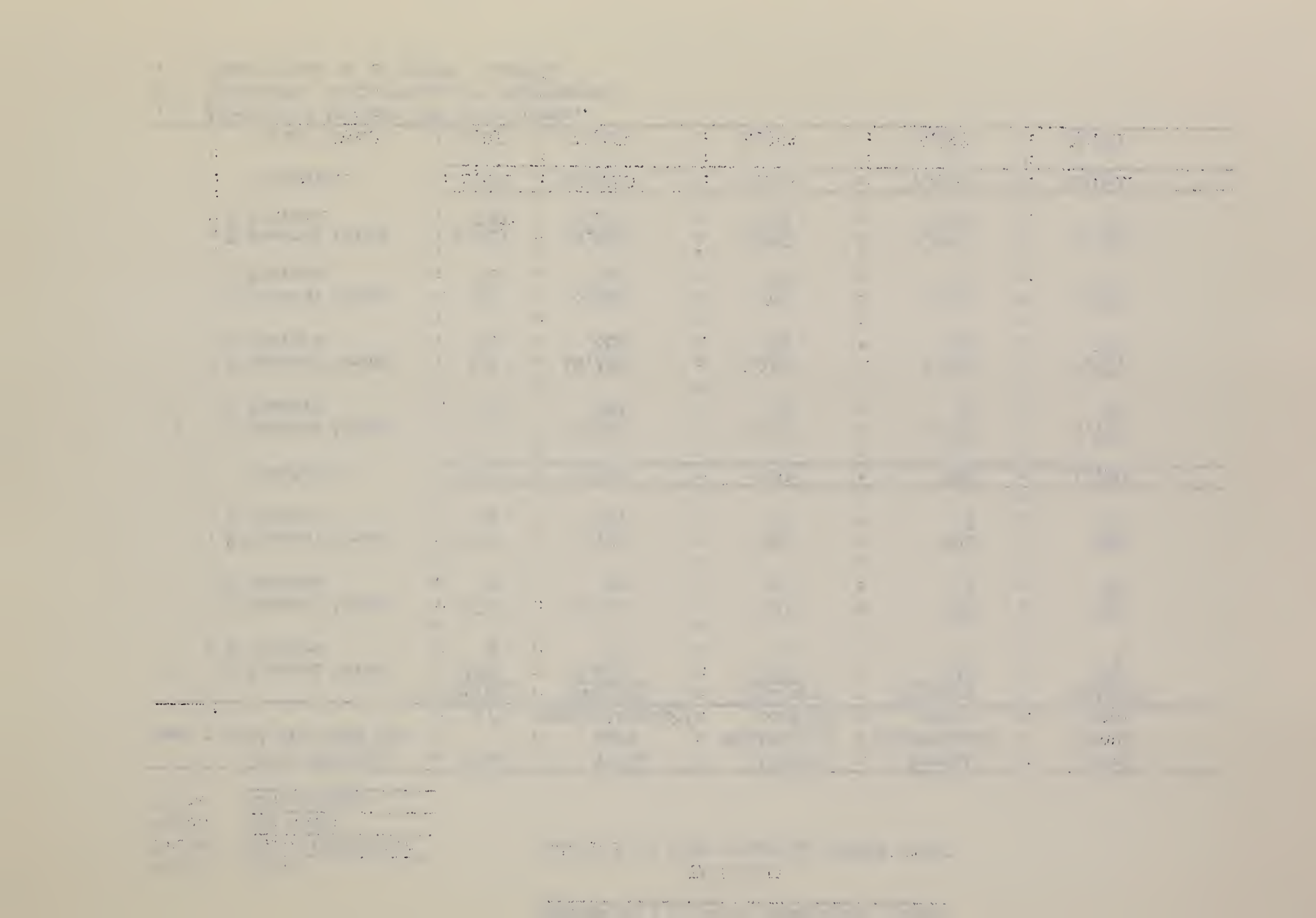
MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost installation 2/	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	6 General Crops	175	2,412	312	371	683
	6 Pasture	3	31	4	2	6
	7 General Crops	152	2,470	320	285	605
	7 Pasture	6	89	12	3	15
	8 General Crops	107	1,740	225	201	426
	8 Pasture	14	207	27	8	35
	Subtotal	457	6,949	900	870	1,770
B	1 General Crops	811	15,130	1,959	1,746	3,705
	1 Pasture	25	261	34	6	40
	6 General Crops	737	10,156	1,315	1,562	2,877
	6 Pasture	61	642	83	49	132
	7 General Crops	372	6,045	783	698	1,481
	7 Pasture	10	148	19	6	25
	8 General Crops	1,813	29,460	3,815	3,399	7,214
	8 Pasture	233	3,438	445	132	577
	Subtotal	4,062	65,280	8,453	7,598	16,051
	Grand Total	4,519	72,229	9,353	8,468	17,821

1/Does not include 10% other lands.
2/Includes engineering and contingency.
3/Amortized at 10 years. (.12950)



MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu.Yd.	132,822	.15	19,923
Spreading Spoil	Cu.Yd.	51,422	.03	1,543
Clearing right-of-way	Ac.	7	75.00	525
Right-of-way eastments	Ac.	131	131.40	22,860
Crossings	Ft.	146	40.00	5,840
Swinging water gaps				
Grade control structures				
Flap gates				
Clearing and Snagging	Ac.	110	288.55	31,740
Total construction cost	xx	xx	xx	82,431
Engineering cost	xx	xx	xx	8,243
Contingencies and legal	xx	xx	xx	8,243
Total installation cost				98,917
Annual equivalent - installation cost (amortized over 20 years at 3½ percent)				6,960
Annual maintenance cost				4,122
Total annual cost of required group facilities				11,082

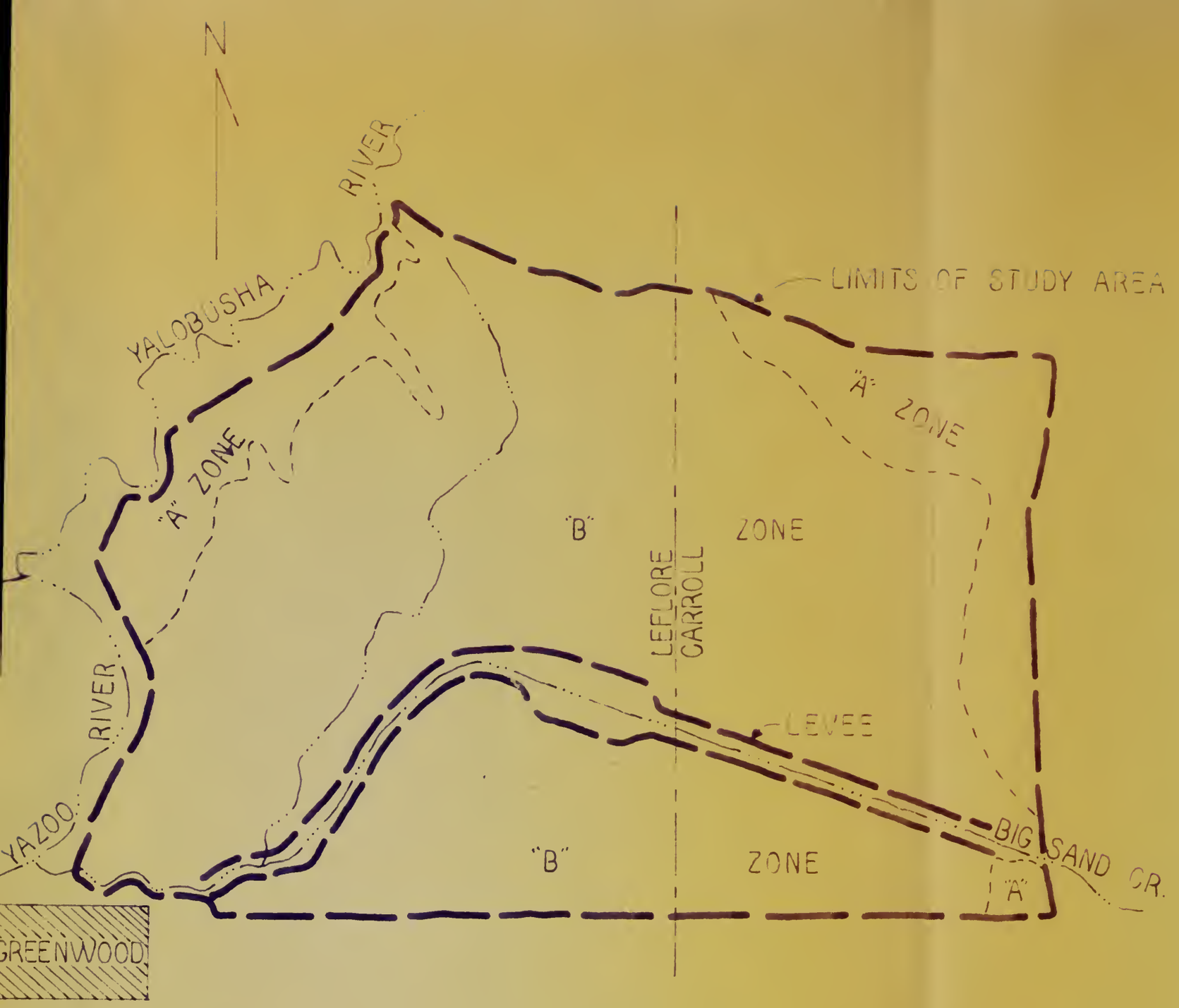
MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Big Sand
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS
AND ASSOCIATED COSTS

(1) Item	(2) Total	(3) Discounted amount
	Dollars	Dollars
1. Net return with project	300,779	
2. Net return without project	216,110	
3. Gross benefit to project	84,669	52,602 1/
4. Farm drainage cost		
a. Installation cost	9,353	
b. Maintenance cost	8,468	
c. Total	17,821	12,479 2/
5. Group drainage cost		
a. Installation cost	6,960	
b. Maintenance cost	4,122	
c. Total	11,082	9,202 3/
6. Conversion cost		
a. Installation cost	8,197	
b. Maintenance cost	6,913	
c. Total	15,110	10,580 2/

1/ Discount factor for 20 years @ 5% - .62127
2/ Discount factor for 15 years @ 5% - .70023
3/ Discount factor for 10 years @ 3½%- .83033



LEGEND

LIMITS OF STUDY AREA AND LEVEES

ZONE BOUNDARY — "A" ZONE

RIVER, STREAMS

COUNTY LINE

LOCATION MAP

YAZOO HEADWATER PROJECT

BIG SAND CREEK AREA

MISSISSIPPI

SCALE 1:62,500

IV. POTACOCOWA-TEOC CREEKS

Description of Area

Potacocowa and Teoc Creeks are located in Carroll County and lie between the Bluff Hills on the east and the Yalobusha River on the west. The project area consists of 21,630 acres of which 4,590 are above the limits of maximum overflow (A Zone); 12,690 acres below the limits of maximum overflow (B Zone). There is no C Zone but there is 4,350 acres in proposed floodways. Of the 21,630 acres, 11,570 acres are openland and 10,060 acres are woodland.

Soils and Topography:

Approximately 70 percent of the soils in the A Zone are well drained silt loams and occupy nearly level to gentle slopes; the remaining 30 percent are somewhat poorly drained silt loams on level slopes.

There is a wide range of soil characteristics in the B Zone. Approximately 14 percent is level, very poorly drained clays subject to frequent overflow; 65 percent is somewhat poorly drained silt loam and clay loam soils on level to gentle slopes; 9 percent is well drained silt loams on nearly level slopes and 11 percent sand deposits. Approximately 1 percent is in swamp.

Problems Within the Project

Most of the problems in the project are directly related to the characteristics of the upland portion of the watershed. Steep slopes, adverse hydrologic soil conditions; poor cover and somewhat impervious soils are conducive to high runoff. The loess soil is extremely erosive and in many places gullies have penetrated into the underlying Coastal Plain material. High runoff plus erosive soil conditions has caused considerable floodwater and sediment damages in the alluvial floodplain. Even though the floodway is leveed, there are storms of sufficient magnitude to cause frequent failures to the levee system.

The risk of damage to land from levee failures has resulted in an inadequate farm and group drainage system for lands near the floodway. The level of management and development within the area is not equal to similar areas with full protection.

Existing Works of Improvement

There are no works of improvement within the project boundaries. The local drainage districts have attempted to confine the flow of these streams within a leveed floodway.

Proposed Plan of Improvement

The character of the propos ed project consists of diversion of Potacocowa and Teoc Creeks from their present locations in the delta area

to a common desilting basin in the low-lying wooded area east of Whaley.

Effects of Proposed Plan for Improvement and Development of Area:

The proposed plan will provide protection to the B Zone from floodwaters and sediment that originate in the upland portion of the watershed. It will also provide adequate farm and group drainage systems, increase the level of management, and extend development of woodlands for row crops and pasture.

Land Use:

At present approximately 61 percent of the entire project area is openland; the remaining 39 percent is in woodland. Most of the woodland is found in soil mapping unit 8.

There is some land clearing going on in the project area at present and this trend is expected to continue. This has been brought about by prior works of improvement mainly the construction of Grenada Reservoir and channel realignment on the Yalobusha River. It is estimated that 1,482 acres of woodland will be cleared in the future without the project in the A and B Zones. With the project in effect approximately 1,344 additional acres of woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping units 1 and 8. These are the soils that will benefit most from additional and improved drainage facilities.

Approximately 100 acres, which is less than 2 percent of the total woodland in the project, is dedicated to forest uses.

Saw timber size stands of good species occur on about a third of the woodland in the project area and good pole size stands are on approximately another third. Good yields are, therefore, obtainable in the near future due to good growth rates on valuable species. The timber on approximately 15 percent of the area has been killed by silting.

Farm Drainage Systems and Cost:

Table VII contains estimates of amounts and cost of farm drainage systems by soil mapping units that can be expected to be constructed after satisfactory group drainage systems and adequate levee protection are provided. These systems anticipate that 10 percent of the wet lands will be used for roads, farmsteads, etc. In the B Zone it is estimated that 61 percent of the gross open land is presently drained or will be drained without the project. Of the remaining land it is estimated that 82 percent will be drained and used for crop and pasture production. The remaining 18 percent will remain wet land due to lack of farmer participation. In the A Zone it is estimated that 80 percent of the gross open land is presently drained or will be drained without the project. It is estimated that 79 percent of the remaining land will be drained and used for crop and pasture production. The remaining 21 percent will remain wet lands due to lack of farmer participation.

Cost includes the installation (construction, engineering, and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements vary by soil mapping unit and land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Cost includes all ditching and appurtenant structure needed for systems to serve an average of one square mile. Estimates are based on standard design for conditions involved.

Farm drainage system capital cost have been amortized for a useful life period of 10 years at 5 percent. The life expectancy of farm drainage systems is influenced by soil units, cropping patterns, which are largely determined by soil units, and the stability of the agriculture in the study area. It is anticipated that the life expectancy will be 10 years. Maintenance cost varying with soil mapping units and land use have been added to the amortized annual equivalent of the installation cost to derive the total annual cost for farm drainage systems. Present cost of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost were estimated on a project wide basis. Ditches were designed to accomodate both A and B Zones.

Approximately 22.5 miles of group drainage, consisting of natural drains and dragline ditch, are now in place and will require maintenance only to furnish adequate outlet for farm drainage systems now existing and anticipated without the proposed project works of improvement.

Channel enlargement on approximately 13.4 miles, lowering the gradient on approximately 12 miles and the construction of approximately 3 miles of new ditches will be required to provide adequate group facilities for farm drainage systems anticipated with the project works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structures. Installation cost have been amortized for a useful life period of 20 years at 3½ percent. Maintenance cost have been added to this amount to derive the total annual cost for group drainage systems.

It has been determined that the useful life of group drainage ditches is 20 years. This is based on the known life of comparative ditches in this immediate vicinity.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project works of improvement will be improvements in farm and group drainage systems and improved management and better use of technological advancement as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting in better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual returns and benefits from Table V; (2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag used was 20 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual values of farm drainage installation and maintenance costs have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 15 years, (3) average life of measure 10 years, and (4) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 15 years, and (3) period of analysis 50 years.

Annual value of group drainage installation and maintenance costs have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 10 years, (3) life of measure 20 years, and (4) period of analysis 50 years.

The lags described above are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress towards realization of full benefits from proposed project works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 10 years from the last period of installation.

2. Land conversions and the complete installation of farm drainage systems is expected to take 5 years after installation of group drainage systems or 15 years after project installation.

3. Realization of maximum estimated yields and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed or a total of 20 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of lag, and to level off at

the end of the period of lag and continue at a constant rate to the end of the project life of 50 years.

Summary

The installation of planned works of improvement will provide protection on 12,690 acres of land. In addition it is anticipated that the protection from flooding will activate the construction of adequate outlets for farm and group drainage on approximately 3,663 acres of land within the project.

It is anticipated that as a result of planned works of improvement flooding due to levee failures will be eliminated.

As a result of agricultural development within the project due to increased drainage facilities there will be an annual gross benefit of $37,989; annual associated cost of $22,500; with an annual net benefit to project of $15,489.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

TABLE I
Existing Land Use by Soil Mapping Units

Zone A - Drainage Calculations Only

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
7	2,256	20	2,276
7S	844	100	944
8	1,170	200	1,370
Subtotal-All Soils	4,270	320	4,570

Zone B - Drainage and Flood Control Calculations

1	480	1,318	1,798
6S	875	93	968
7	934	185	1,119
8	2,009	2,147	4,156
8U	1,600	1,513	3,113
13U	352	1,024	1,376
14		160	160
Subtotal-All Soils	6,250	6,440	12,690
Total - Project	10,520	6,760	17,260

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE II A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	1,222			
	Crops	1,100			
	Cotton	224	Lbs. Lint	399	89,300
	Corn	158	Bu.	31	4,932
	Soybeans	236	Bu.	19	4,400
	Soybeans (Fol.oats)	(51)	Bu.	12	612
	Small Grains	67	Bu.	34	2,262
	Idle	22			
	Pasture	393	Lbs. Beef	171	67,100
	Other 1/	122			
	Forest Land	320			
		4/			
	Total	1,542			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 3,048 acres of land that is already drained.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE III A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	626						5/		
	Crops	564				4/				
	Cotton	140	Lbs.Lint	446	62,420	0.318286	19,867	117.31	16,424	3,443
	Corn	61	Bu.	40	2,454	1.45	3,558	34.05	2,077	1,481
	Soybeans	132	Bu.	24	3,161	2.35	7,429	23.58	3,772	3,657
	Soybeans (Fol.oats)	(14)	Bu.	16	218	2.35	513	22.29	312	201
	Small Grains	40	Bu.	37	1,470	0.95	1,397	25.35	1,014	383
	Idle	11				5 6/				
	Pasture	180	Lbs.Beef	202	36,400	0.1805	6,570	19.25	3,465	3,105
	Other 1/	62								
	Forest Land	38				10.75	408	6.44	245	163
	Total	7/ 664					39,742		27,309	12,433

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 3,926 acres of land that will not benefit from additional drainage due to the project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	664						5/		
	Crops	598				4/				
	Cotton	267	lbs.Lint	695	185,520	0.318286	59,048	169.99	45,388	13,660
	Corn	60	Bu.	64	3,836	1.45	5,563	53.20	3,192	2,371
	Soybeans	60	Bu.	31	1,872	2.35	4,399	38.17	2,290	2,109
	Soybeans (Fol.oats)	(17)	Bu.	19	331	2.35	778	30.76	523	255
	Small Grains	49	Bu.	50	2,456	0.95	2,334	32.00	1,568	766
	Idle	13				6/				
	Pasture	149	lbs.Beef	277	41,290	0.1805	7,453	25.71	3,831	3,622
	Other 1/	66								
		7/								
	Total	664					79,575		56,792	22,783

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 3,926 acres of land that will not benefit from additional drainage due to the project.

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	6,250			
	Crops	5,625			
	Cotton	1,461	Lbs. Lint	393	573,820
	Corn	611	Bu.	31	19,002
	Soybeans	1,217	Bu.	17	21,068
	Soybeans (Fol.oats)	(735)	Bu.	11	8,105
	Small Grains	850	Bu.	34	28,716
	Idle	113			
	Pasture	1,373	Lbs. Beef	178	244,690
	Other 1/	625			
	Forest Land	6,340			
		4/			
	Total	12,590			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 100 acres of dedicated woodland.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	7,632						5/		
	Crops	6,869				4/				
	Cotton	2,581	Lbs.Lint	490	1,264,340	0.318286	402,422	129.74	334,871	67,551
	Corn	456	Bu.	45	20,720	1.45	30,044	41.63	18,982	11,062
	Soybeans	854	Bu.	22	19,072	2.35	44,819	31.57	26,962	17,857
	Soybeans (Fol.oats)	(795)	Bu.	15	11,858	2.35	27,866	26.78	21,288	6,578
	Small Grains	966	Bu.	40	38,620	0.95	36,690	26.97	26,056	10,634
	Idle	211				6/				
	Pasture	1,801	Lbs. Beef	206	371,770	0.1805	67,105	19.68	35,400	31,705
	Other 1/	763								
	Forest Land	1,306				10.75	14,040	6.44	8,412	5,628
		7/								
	Total	8,938					622,986		471,971	151,015

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 3,752 acres of woodland that will not be cleared.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	8,938						5/		
	Crops	8,044				4/				
	Cotton	2,850	Lbs.Lint	548	1,560,720	0.318286	496,754	142.22	405,330	91,424
	Corn	495	Bu.	53	26,072	1.45	37,804	45.79	22,665	15,139
	Soybeans	1,179	Bu.	26	30,641	2.35	72,006	34.94	41,192	30,814
	Soybeans (Fol.oats)	(851)	Bu.	17	14,083	2.35	33,096	28.93	24,619	8,477
	Small Grains	1,035	Bu.	44	46,050	0.95	43,748	29.26	30,283	13,465
	Idle	162				6/				
	Pasture	2,323	Lbs.Beef	211	489,230	0.1805	88,305	19.72	45,812	42,493
	Other 1/	894								
		7/								
	Total	8,938					771,713		569,901	201,812

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 3,752 acres of woodland that will not be cleared.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) Future Without Project (Production in Dollars) Gross	(4) Cost	(5) Net	(6) Future With Project (Production in Dollars) Gross	(7) Cost	(8) Net	(9) Difference In Net Value
Zone A (Not Subject To Flooding)								
7	369	22,588	15,545	7,043	48,497	34,632	13,865	6,822
7S	143	12,617	8,474	4,143	19,428	13,775	5,653	1,510
8	152	4,537	3,290	1,247	11,650	8,385	3,265	2,018
1/ Subtotal	664	39,742	27,309	12,433	79,575	56,792	22,783	10,350
Zone B (Subject To Flooding)								
1	1,150	31,867	22,428	9,439	68,272	45,792	22,480	13,041
6S	929	81,889	60,509	21,380	88,341	64,757	23,584	2,204
7	1,049	134,104	98,043	36,061	155,556	112,375	43,181	7,120
8	2,997	217,226	169,464	47,762	260,772	198,257	62,515	14,753
8U	2,205	151,282	118,088	33,194	190,065	144,689	45,376	12,182
13U	608	6,618	3,439	3,179	8,707	4,031	4,676	1,497
2/ Subtotal	8,938	622,986	471,971	151,015	771,713	569,901	201,812	50,797
TOTAL	9,602	662,728	499,280	163,448	851,288	626,693	224,595	61,147

1/ Total area of Zone A reduced by 3,926 acres not anticipated to receive drainage benefits from project.
2/ Total area of Zone B reduced by 3,752 acres estimated to remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

TABLE VI

LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55	12.50	xx	xx	67.50
W to IC	xx	-	-	xx		
W to P	xx	55	5.00	28	xx	88.00
P to GC	xx	xx	5.00	xx	xx	5.00
P to IC	xx	xx	-	xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx	17		17.00
Total per acre	xx					
Project						
W to GC	755	41,525	9,438	xx	xx	50,963
W to IC				xx		
W to P	454	24,970	2,270	12,712	xx	39,952
P to GC	31	xx	155	xx	xx	155
P to IC		xx		xx		
GC to IC		xx	xx	xx		
GC to P	68	xx	xx	1,156		1,156
Total project	xx	66,495	11,863	13,868		92,226
Annual amortized value 2/	xx	xx	xx	xx	xx	5,052
Annual maintenance	xx	xx	xx	5.49	xx	2,866
Total annual cost of conversions	xx	xx	xx	xx	xx	7,918

1/ W--woodland; GC--general dry-farmed crops; IC--irrigated crops (rice); P--pasture

2/ Amortized over a 50-period at 5 percent (.05478).

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost installation 2/	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	7 General Crops	325	5,280	684	609	1,293
	7 Pasture	7	103	13	4	17
	7S General Crops	126	2,048	265	236	501
	7S Pasture	3	44	6	2	8
	8 General Crops	125	2,030	263	234	497
	8 Pasture	12	177	23	7	30
	Subtotal	598	9,682	1,254	1,092	2,346
B	1 General Crops	626	11,678	1,512	1,347	2,859
	1 Pasture	111	1,162	150	27	177
	6 General Crops	266	3,666	475	564	1,039
	6 Pasture	32	337	44	26	70
	7 General Crops	221	3,590	465	414	879
	7 Pasture	2	30	4	1	5
	8 General Crops	1,347	21,890	2,835	2,526	5,361
	8 Pasture	94	1,387	180	53	233
	Subtotal	2,699	43,740	5,665	4,958	10,623
	Total	3,297	53,422	6,919	6,050	12,969

1/ Does not include 10% other lands.
2/ Includes engineering and contingencies.
3/ Amortized over 10 years @ 5% (.12950)

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu.Yd.	156,228	.15	23,434
Spreading Spoil	Cu.Yd.	36,991	.03	1,110
Clearing right-of-way	Ac.	15	75.00	1,125
Right-of-way easements	Ac.	155	91.74	14,220
Crossings	Ft.	56	40.00	2,240
Clearing and Snagging	Ac.	196	145.00	28,420
Total construction cost	xx	xx	xx	70,549
Engineering cost	xx	xx	xx	7,055
Contingencies and legal	xx	xx	xx	7,055
Total installation cost				84,659
Annual equivalent - installation cost (amortized for 20 years at 3½%)				5,957
Annual maintenance cost				3,527
Total annual cost of required group facilities				9,484

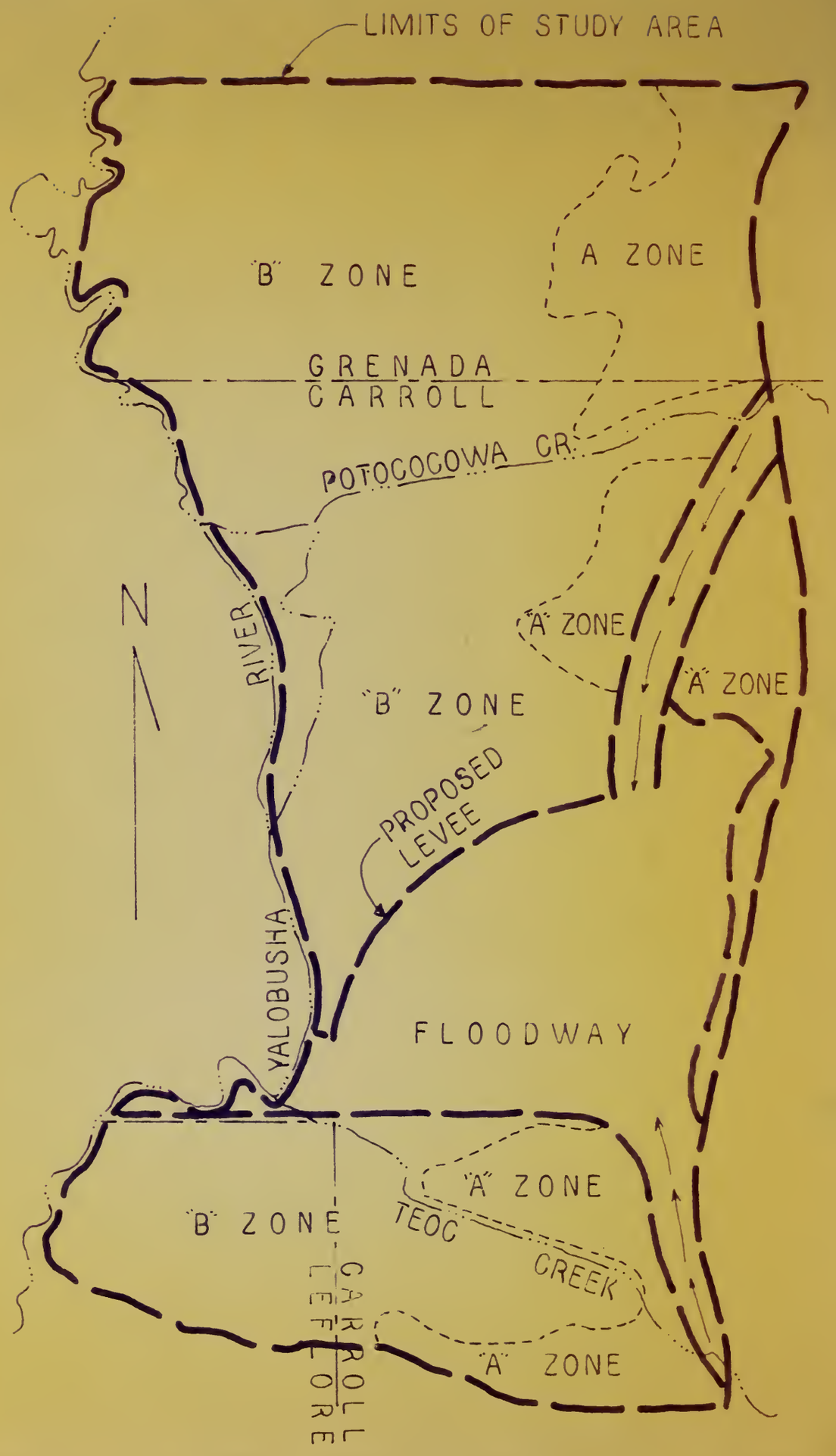
MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Potacocowa-Teoc
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS AND ASSOCIATED COSTS

(1) Item	(2) Total	(3) Discounted amount
	Dollars	Dollars
1. Net return with project	224,595	
2. Net return without project	163,448	
3. Gross benefit to project	61,147	37,989 1/
4. Farm drainage cost		
a. Installation cost	6,919	
b. Maintenance cost	6,050	
c. Total	12,969	9,081 2/
5. Group drainage cost		
a. Installation cost	5,957	
b. Maintenance cost	3,527	
c. Total	9,484	7,875 3/
6. Conversion cost		
a. Installation cost	5,052	
b. Maintenance cost	2,866	
c. Total	7,918	5,544 2/

1/ Discount factor for 20 years @ 5% - .62127
2/ Discount factor for 15 years @ 5% - .70023
3/ Discount factor for 10 years @ 3½% -.83033



LEGEND

LIMITS OF STUDY AREA AND PROPOSED LEVEES

ZONE BOUNDARY ("A" ZONE)

RIVERS, STREAMS

COUNTY LINE

LOCATION MAP

YAZOO HEADWATER PROJECT

POTOCOCOWA-TEOC CREEKS AREA

MISSISSIPPI

SCALE 1:62,500

V. SWAN LAKE AREA

Description of the Area

The Swan Lake Area project is located in the southern part of Quitman County and the northern part of Tallahatchie County. It lies between the loessial bluff on the east and Cassidy Bayou on the west. The Tallahatchie River runs through the project in a southerly direction and provides outlets for group drainage facilities within the project. The upper limits of project effectiveness generally follows the 154' contour. The lower limits of project effectiveness, contact between the B and C Zones, generally follows the 145' contour. The installation of the Upper Auxiliary Channel will decrease the three-year frequency flooding from approximately 88,000 acres to 38,350 acres (C Zone). The area studied included 94,650 acres (B Zone) that lies between the upper limits of overflow without project and the three-year frequency of overflow with project. No study was made of an A Zone in this project.

Soils and Topography:

Within the B Zone approximately 46 percent of the soils are level, very poorly drained heavy clays (soil unit 1); 32 percent level to gently sloping, somewhat poorly drained silt loam and clay loam soils (soil units 6 and 8); 18 percent gently sloping, well drained sandy loam soils (soil units 4 and 7); 4 percent swamp and water area.

The soils within the C Zone are as follows: 73 percent soil unit 1, 13 percent soil units 6 and 8, 4 percent soil units 4 and 7, and 10 percent swamp and water area.

Problems Within the Project

Prior to the completion of major works of improvement by the Corps of Engineers that included the construction of Arkabutla, Sardis and Enid Reservoirs, channel improvement, levees, etc., this area was subject to frequent flooding. Considerable sediment was being discharged. Some of the land was abandoned and much of the low-lying heavy clay soils and depressional areas associated with the better drained soils could not be utilized properly due to floodwaters remaining on the land unitl late spring or early summer. This condition affected the better drained lands by not providing proper drainage, delayed planting of desired crops and isolating areas until floodwater could recede.

Existing Works of Improvement

Existing works of improvement consists of channel improvement and realignment on the Tallahatchie, Coldwater and Yocona Rivers. The Panola-Quitman overflow canal was constructed and now carries the Tallahatchie and Yocona Rivers. Levees have been constructed on the Panola-Quitman Floodway and on Tilltobia Creek. Channel improvement work that consisted of clearing and snagging has been completed on Cassidy Bayou. Drainage Districts have constructed over 50 percent of the group drainage facilities needed to adequately drain the area with the project in place.

Proposed Plan of Improvement

The project involves the installation of a new high water diversion known as the Upper Auxiliary Channel. The diversion would begin at Chute bridge near Swan Lake and join the Yazoo River about 15 miles northeast of Belzoni near the village of Famosla. The project also involves the development of drainage facilities which include channel cleanout of O'Possum Bayou; channel enlargement of Newsome Drainage Ditch Number 2; channel improvement of Muddy Bayou; and channel improvement of Hurricane Bayou. Gaps in the present levee system east and north of the Tallahatchie River in the vicinity of Swan Lake would be closed so that all flows would go through the main river (Tallahatchie) or the Upper Auxiliary Channel.

Effects of Proposed Plan For Improvement and Development of Area:

With proposed works installed, there would be suitable major outlets to serve farm and group drainage for the area between upper and lower limits of project effectiveness. As established by the Corps of Engineers, an area of 94,650 acres (B Zone) will receive drainage and flood control benefits. Thirty-eight thousand three hundred fifty (38,350) acres (C Zone) will have access to group drainage facilities but is within the three-year flooding frequency as determined by the Corps of Engineers.

Land Use:

At present approximately 51 percent of the entire project area (Zones B and C) is open land, 47 percent is woodland and 2 percent is covered by water. Most of the woodland is found in soil mapping units 1 and 8. There is very little woodland on soil mapping units 4, 6, and 7.

A considerable amount of land clearing is going on in the project area at present and this trend is expected to continue. This has been brought about by prior works of improvement such as the construction of Enid, Sardis, and Arksbutla Reservoirs, levees, channel improvement, etc. It is estimated that more than 25,000 acres of woodland will be cleared in the future without the project in the B and C Zones. With the project in effect approximately 7,000 additional acres of woodland will be cleared and put into crops and pasture. Most of the land cleared is expected to occur on soil mapping units 1 and 8. These soils will benefit most from additional and improved drainage facilities. No additional land clearing is anticipated on soil mapping unit 4 with this project in effect in Zone B because drainage is not a major problem on this land.

The woodlands in the project area are generally in poor condition due to past fire damages and poor cutting practices. There is little evidence of recent fires. Poor cutting practices continue to effect present timber production; however, a large portion of the woodlands are in a condition to produce a steady income provided good management practices are adopted.

An area of several thousand acres in the C Zone was apparently

killed several years ago by flooding during the growing season. Saplings of desirable species are gradually increasing in this area.

Farm Drainage Systems and Costs:

Table VII contains estimates of amounts and costs of farm drainage systems by soil mapping units that will be constructed after satisfactory group drainage systems and adequate major outlets are developed. These estimates anticipate that 77 percent of the gross open land will be drained and used for crop and pasture production with the project in effect. Approximately 13 percent will remain as wet land due to lack of farmer participation. The remainder will be utilized in roads, farmsteads, etc.

Costs include the installation (construction, engineering and contingency) required for farm drainage systems for the satisfactory removal of surface water to alleviate detremental effects on crop production. Requirements vary by soil mapping units and by land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Costs include all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates are based on standard design data for conditions involved.

Farm drainage systems capital costs have been amortized for a useful life period of ten years at 5 percent. The life expectancy of farm drainage systems is influenced by cropping patterns, which are largely determined by soil units. It was determined that the life expectancy ranged from 9 to 15 years with a weighted average for all soil units approximately 10 years. Maintenance cost, varying with soil mapping units and land use, have been added to the amortized annual equivalent of installation cost to derive the annual cost of farm drainage systems.

Farm drainage systems and costs were determined for the B Zone only.

Group Drainage Systems and Costs:

Group drainage systems and costs were established on a project wide basis. Any group drainage ditches running through Zone C were for the purpose of tying in Zone B with the major drainage outlets proposed in this project.

Approximately 52 miles of group drainage ditches are now in place and will require maintenance only to furnish adequate outlets for farm drainage systems now existing and anticipated without the proposed project works of improvement.

Channel improvement on approximately 26 miles of natural outlets, and the construction of 22 miles of new ditches will be required to provide adequate group facilities for farm drainage systems anticipated with the project works of improvement in place.

Table VIII itemizes the cost required to install and maintain

intermediate group drainage facilities and appurtenant structures. Installation costs have been amortized for a useful life period of 20 years at 3½ percent. This is based on the known life of comparable ditches in this immediate vicinity. Maintenance costs have been added to this amount to derive the total annual cost of group drainage systems.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project works of improvement will be almost entirely from improvements in farm and group drainage systems and resulting improved management and better use of technological advancement as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting from better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual returns and benefits from Table V for Zones B and C; (2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits (after project installation) of approximately 25 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual values of farm drainage costs (installation and maintenance) have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 20 years, (3) life of measure 10 years, and (4) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 20 years, and (3) period of analysis of 50 years.

Annual value of group drainage costs (installation and maintenance) have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 10 years, (3) life of measure 20 years, and (4) period of analysis 50 years.

Based upon local experience and present trend it is estimated that a period of 25 years will elapse after the project is installed before full project benefits will accrue. This 25-year lag is due to three separate steps as follows:

1. Installation of group drainage facilities is expected to take ten years. This estimate is based on local experience with organized drainage districts.

2. After installation of group drainage facilities, it is estimated that it will take 10 years to completely install farm drainage systems. This estimate is based on the rate farm drainage systems are being installed in similar areas in which group drainage systems have already been installed.

3. After installation of group and farm drainage systems, it is expected that it will take 5 years before maximum crop yields as used in this report will be realized. This estimate is based on observation and knowledge of local technicians and land owners and upon anticipated increases in technology and levels of management.

Summary

Prior to the completion of major works of improvement by the Corps of Engineers on headwater streams, the Swan Lake Area was poorly developed from an agricultural standpoint. This was due primarily to frequent flooding and inadequate drainage facilities. Since the completion of these works of improvement, agricultural development has proceeded at a rapid rate.

It is anticipated that this development will continue for some time without the project. However, with the proposed project in effect; areas subject to frequent flooding will decrease materially and agricultural development can be expected to continue to a higher degree, producing increased annual discounted net returns (indicated in Table IX) of $381,292. To obtain this increased gross project benefits an annual equivalent associated cost of $122,685 will be required, leaving $258,607 as annual (discounted) net benefits to the project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

TABLE I

Existing Land Use by Soil Mapping Units

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
Zone B - Drainage and Flood Control Calculations			
1	22,112	21,318	43,430
4	14,549	1,015	15,564
6	15,447	3,008	18,455
7	1,295	190	1,485
8	8,574	3,534	12,108
14	-	1,223	1,223
Subtotal-all soils	61,977	30,288	92,265
Water	-	-	2,385
Total - Zone B	61,977	30,288	94,650
Zone C - Flood Control Calculations			
1	3,510	24,483	27,993
4	260	680	940
6	619	1,594	1,213
7	450	100	550
8	696	1,972	2,668
14	-	3,346	3,346
Subtotal-all soils	5,535	32,175	37,710
Water	-	-	640
Total - Zone C	5,535	32,175	38,350
Total - All Soils	67,512	62,463	129,975
Water			3,025
Total - Project	67,512	62,463	133,000

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land use and crop distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Total
		2/		3/	
All	Open Land	61,977			
	Crops	55,782			
	Cotton	18,072	lbs.lint	444	8,030,780
	Corn	7,561	Bu.	26	196,810
	Rice	1,726	Cwt.	25	42,865
	Soybeans	13,583	Bu.	16	219,651
	Oats (Grain)	5,277	Bu.	38	198,024
	Soybeans (Fol. Oats)	(2,441)	Bu.	11	25,753
	Idle	1,115			
	Pasture	8,448	lbs.beef	155	1,310,048
	Other 1/	6,195			
	Forest Land	26,346			
		4/			
	Total	88,323			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 2,719 acres remaining in woods; 2,385 acres water area and 1,223 acres in swamp (woodland).

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of production Per Unit	(8) Value of production Total	(9) Cost of production Per Acre	(10) Cost of production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	74,595						5/		
	Crops	67,136				4/				
	Cotton	35,624	lbs.lint	549	19,560,481	0.318286	6,225,827	145.26	5,174,597	1,051,230
	Corn	5,762	Bu.	35	201,950	1.45	292,827	36.15	208,307	84,520
	Rice	2,912	Cwt.	26	76,688	3.75	287,580	96.85	282,041	5,539
	Soybeans	6,962	Bu.	22	154,260	2.35	362,511	32.31	224,969	137,542
	Oats (Grain)	4,052	Bu.	42	171,110	0.95	162,554	28.11	113,918	48,636
	Soybeans(Fol.Oats)	(2,182)	Bu.	17	37,731	2.35	88,667	28.43	62,045	26,622
	Idle	1,342				6/				
	Pasture	10,482	lbs.beef	221	2,315,707	0.1805	417,985	23.43	245,564	172,421
	Other 1/	7,459								
	Forest Land	6,985	Acre			13.3623	93,336	8.37	58,454	34,882
		7/								
	TOTAL	81,580					7,931,287		6,369,895	1,561,392

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6, rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle)
7/ Total does not include 10,685 acres remaining in woods and swamps; 2,385 acres water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices).

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of production Per Unit	(8) Value of production Total	(9) Cost of production Per Acre	(10) Cost of production Total	(11) Net Return
		2/		3/		Dollars 4/	Dollars	Dollars 5/	Dollars	Dollars
All	Open Land	81,580								
	Crops	73,422								
	Cotton	37,142	lbs.lint	627	23,274,556	0.318286	7,407,965	160.19	5,949,908	1,458,057
	Corn	5,478	Bu.	45	247,448	1.45	358,799	41.69	228,401	130,398
	Rice	3,345	Cwt.	29	97,322	3.75	364,958	105.65	353,394	11,564
	Soybeans	7,122	Bu.	27	193,861	2.35	455,574	35.62	253,671	201,903
	Oats (Grain)	6,092	Bu.	47	285,388	0.95	271,118	30.48	185,677	85,441
	Soybeans(Fol.Oats)	(4,287)	Bu.	20	84,770	2.35	199,209	30.75	131,845	67,364
	Idle	1,467				6/				
	Pasture	12,776	lbs.beef	289	3,691,646	0.1805	666,342	23.97	370,167	296,175
	Other 1/	8,158								
		7/								
		81,580					9,723,965		7,473,063	2,250,902

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Does not include 10,685 acres remaining in woods and swamps; 2,385 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

SUMMARY - TABLE II C
(Zone of No Project Benefit)
COMPUTATION OF AGRICULTURAL PRODUCTION: EXISTING CONDITIONS

(1) Soil Unit	(2) Land use and crop distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	5,535			
	Crops	4,981			
	Cotton	1,421	lbs.lint	406	576,455
	Corn	1,843	Bu.	16	29,694
	Rice	51	Cwt.	25	1,275
	Soybeans	723	Bu.	15	10,857
	Oats (Grain)	645	Bu.	33	21,154
	Soybeans(Fol.Oats)	(618)	Bu.	9	5,618
	Idle	100			
	Pasture	198	lbs.beef	159	31,522
	Other 1/	554			
	Forest Land	12,667			
		4/			
	Total	18,202			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to the nearest unit.
4/ Does not include 19,508 acres of land that will remain in woods and swamps; 640 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

SUMMARY - TABLE III C
(Zone of No Project Benefit) 2/
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land use and crop distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of production Per Unit	(8) Value of production Total	(9) Cost of production Per Acre	(10) Cost of production Total	(11) Net Return
		3/		4/		Dollars	Dollars	Dollars 6/	Dollars	Dollars
All	Open Land	18,202								
	Crops	16,381				5/				
	Cotton	6,746	lbs.lint	462	3,115,793	0.318286	991,714	128.42	866,339	125,375
	Corn	5,489	Bu.	23	123,996	1.45	179,794	28.17	154,361	25,433
	Rice	1,182	Cwt.	27	31,654	3.75	118,702	98.44	116,353	2,349
	Soybeans	295	Bu.	24	6,982	2.35	16,408	32.46	9,576	6,832
	Oats (Grain)	1,797	Bu.	34	61,254	0.95	58,192	23.99	43,111	15,081
	Soybeans(Fol.Oats)	(1,765)	Bu.	15	26,995	2.35	63,439	27.63	48,771	14,668
	Idle	327				7/				
	Pasture	545	lbs.beef	220	120,153	0.1805	21,688	23.80	12,970	8,718
	Other 1/	1,821								
		8/								
	TOTAL	18,202					1,449,937		1,251,481	198,456

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Data is same for both "with project" and "without project" conditions; no Table IV C required.
3/ Parenthetical amounts are duplicated acreages.
4/ Calculated from columns 3 and 6; rounded to nearest unit.
5/ Composite value of lint and seed per pound lint cotton.
6/ Calculated from columns 3 and 10; rounded to nearest cent.
7/ Composite value of veal calves and herd culls (beef cattle).
8/ Does not include 19,508 acres of land that will remain in woods and swamps; 640 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) (4) (5) Future Without Project (Production in Dollars) Gross	Cost	Net	(6) (7) (8) Future With Project (Production in Dollars) Gross	Cost	Net	(9) Difference In Net
1	53,179	3,697,666	3,207,885	489,781	4,842,006	3,965,341	876,665	386,884
4	15,148	2,457,308	1,826,205	631,103	2,485,536	1,816,669	668,867	37,764
6	17,889	1,822,171	1,448,925	373,246	2,245,758	1,685,315	560,443	187,197
7	1,937	340,288	264,182	76,106	358,304	275,163	83,141	7,035
8	11,629	1,063,791	874,179	189,612	1,242,298	982,056	260,242	70,630
Total	99,782 1/	9,381,224	7,621,376	1,759,848	11,173,902	8,724,544	2,449,358	689,510

1/ Does not include 30,193 acres that will remain in woodland and 3,025 acres of water area.

TABLE VI
LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total Cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55	12.50	xx	xx	
W to IC	xx	55	12.50	xx	32	
W to P	xx	55	5.00	40	xx	
P to GC	xx	xx	-	xx	xx	
P to IC	xx	xx	-	xx	-	
GC to IC	xx	xx	xx	xx	-	
GC to P	xx	xx	xx	40	-	
Project						
W to GC	3,676	202,180	45,950	xx	xx	248,130
W to IC	433	23,815	5,412	xx	13,856	43,083
W to P	2,177	119,735	10,885	87,080	xx	217,700
P to GC	0	xx	-	xx	xx	
P to IC	0	xx	-	xx	-	-
GC to IC	0	xx	xx	xx	-	-
GC to P	117	xx	xx	4,680	-	4,680
Total Project	xx	345,730	62,247	91,760	13,856	513,593
Annual amortized value 2/	xx	xx	xx	xx	xx	28,135
Annual maintenance	xx	xx	xx	18,283	3/ 1,386	19,669
Total annual Cost of Conversions	xx	xx	xx	xx	xx	47,804

1/ W-- woodland; GC-- general dry-farmed crops; IC--irrigated crops (rice); P-- pasture.
2/ Amortized over 50-year period at 5 percent. (.05478)
3/ Irrigation systems only; excluding motors, pumps and relifts.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Soil Mapping Unit and Land Use	Area	Total Cost Installation	Annual Equivalent Installation cost	Annual Maintenance Cost	Total Annual Cost
	1/	2/	3/		
Soil Group 1	Acres	Dollars	Dollars	Dollars	Dollars
General Crops	14,967	279,209	36,156	32,216	68,372
Rice	702	8,990	1,164	346	1,510
Pasture	747	7,817	1,012	180	1,192
Subtotal	16,416	296,016	38,332	32,742	71,074
Soil Group 4					
General Crops	958	12,454	1,613	1,437	3,050
Soil Group 6					
General Crops	4,071	56,098	7,260	8,631	15,896
Soil Group 7					
General Crops	346	5,622	728	649	1,377
Soil Group 8					
General Crops	3,734	60,678	7,858	7,001	14,859
Rice	204	2,612	338	100	438
Subtotal	3,938	63,290	8,196	7,101	15,297
TOTAL	25,729	433,480	56,134	50,560	106,694

1/ Does not include 10% other land.
2/ Includes engineering and contingency costs.
3/ Amortized at 5% over 10 years. Amortization factor is .12950.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: Swan Lake
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu.Yd.	429,348	0.15	64,402
Spreading Spoil	Cu.Yd.	178,223	0.03	5,197
Clearing right-of-way	Ac.	231.1	75.00	17,334
Right-of-way easements	Ac.	481.1	134.60	64,763
Crossings	Ft.	306	40.00	12,240
Swinging water gaps				
Grade control structures				
Flap gates	No.	2	698.00	1,396
Culvert	Ft.	60	25.80	1,544
Clearing and Snagging	Ac.	2,014	300.00	60,420
Total construction cost	xx	xx	xx	227,296
Engineering cost	xx	xx	xx	45,459
Contingencies and legal	xx	xx	xx	22,729
Total installation cost				295,484
Annual equivalent - installation cost (amortized for 20 years at 3½ percent)				20,791
Annual maintenance cost				11,365
Total annual cost of required group facilities				32,156

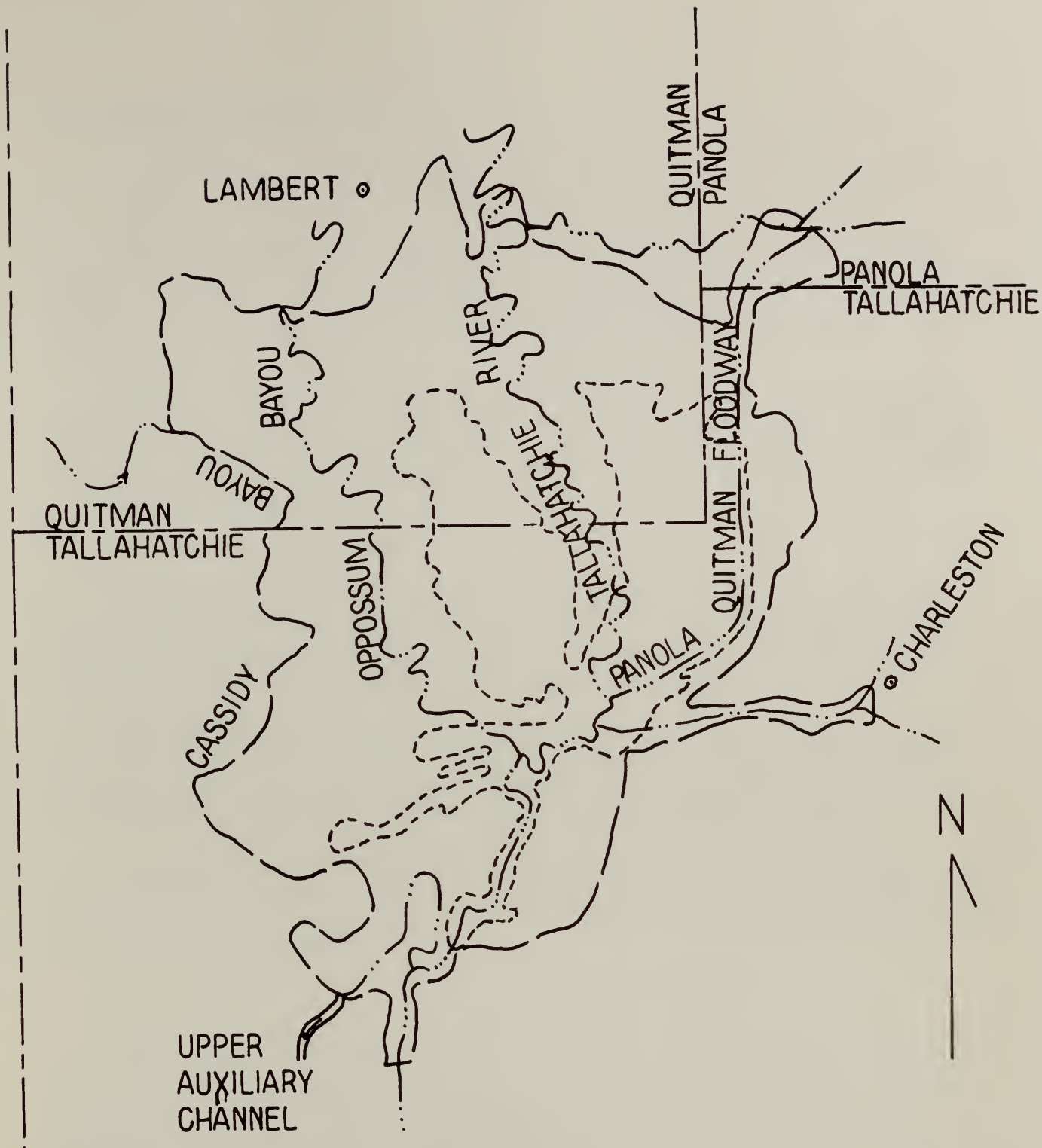
MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Backwater
Reach: Swan Lake
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS AND ASSOCIATED COSTS

(1) Item	(2)	(3) Discounted Amount	
	Dollars	Dollars	
1. Net return with project	2,449,088		
2. Net return without project	1,759,578		
3. Gross benefit to project	689,510	381,292	1/
4. Farm drainage cost			
a. Installation cost	56,134	34,874	
b. Maintenance cost	50,560	31,412	
c. Total	106,694	66,286	2/
5. Group drainage cost			
a. Installation cost	20,791	17,263	
b. Maintenance cost	11,365	9,437	
c. Total	32,156	26,700	3/
6. Conversion cost			
a. Installation cost	28,135	17,479	
b. Maintenance cost	19,669	12,220	
c. Total	47,804	29,699	4/

1/ Discount factor for 25 years @ 5% - .55299
2/ Discount factor for 20 years @ 5% - .62127
3/ Discount factor for 10 years @ 3½% - .83033
4/ Discount factor for 20 years @ 5% - .62127



BOUNDARY AND OUTER LIMITS OF PROJECT

"C" ZONE

COUNTY LINE

RIVERS AND STREAMS

LOCATION MAP

YAZOO HEADWATER PROJECT

SWAN LAKE AREA

MISSISSIPPI

SCALE 1/4" = 1 MILE

USDA SCS SPARTANBURG S.C. 1957

VI. WHITE OAK BAYOU

Description of Area

White Oak Bayou is located in Tunica County with a small portion in the northern parts of Coahoma and Quitman Counties. The study area lies west of the existing west bank levee of Coldwater River and Pompey Ditch, comprising a total of 163,560 acres of delta lands of which 90,770 acres are cleared and 72,790 acres are wooded.

There are approximately 115,820 acres above the limits of maximum overflow without project improvement (A Zone); 39,220 acres between the three-year frequency overflow with project and maximum overflow without project (B Zone); and 8,520 acres below the three-year frequency overflow with project (C Zone).

Soils and Topography:

Within the A Zone approximately 62 percent of the soils are level, very poorly drained heavy clay; 25 percent are level to gently sloping somewhat poorly drained silt loams and clay loams and 13 percent well drained sandy loams on nearly level slopes.

Within the B Zone approximately 82 percent of the soils are level to gently sloping very poorly drained heavy clays; 15 percent somewhat poorly drained silt loams and clay loams on nearly level slopes and the remaining 3 percent well drained sandy loams on gentle slopes.

There is a narrow range of soil conditions in the C Zone. Approximately 87 percent are level to gently sloping, very poorly drained, heavy clay soils and the remaining 13 percent somewhat poorly drained silt loams and clay loams on gentle slopes.

Problems Within the Project

Lack of major drainage outlets is the greatest problem in the area. This is reflected in low yields of cotton, soybeans and corn. There is frequent loss or damage to crops due to ponding of local water; planting dates are delayed in the spring because of inadequate farm drainage systems to remove surface waters from winter and spring rains. There is a comparatively low level of management throughout the B Zone.

Existing Works of Improvement

There are no works of improvement within the project study area. Local drainage districts have functioned for several years to improve the drainage in the southern part of Tunica County.

Proposed Plan of Improvement

The character of the proposed project consists of 54 miles of channel improvement in old Coldwater River, Brushy Bayou, Walnut Lake

and White Oak Bayou. This improvement will start at Old Coldwater River at the head of the authorized diversion to Cassidy Bayou and extend to the head of White Oak Bayou about one mile west of Tunica, Mississippi. Design capacity of the improved outlet is based upon the Cypress Creek formula using the value of C as 50.

Effects of Proposed Plan for Improvement and Development of Area:

The proposed plan will afford protection from floodwater damages in the B Zone. This protection and works of improvement will also provide adequate outlets for farm and group drainage systems, increase the level of management, and extend the development of wooded areas for row crops and pasture.

Land Use:

At present approximately 63 percent of the entire project area is open land, 36 percent is woodland and 1 percent is urban and water area. Most of the woodland is found in soil mapping unit 1.

There is some land clearing going on in the area at present. This trend is expected to continue and has partially been brought about by prior works of improvement such as channel realignment and improvement, levees, the construction of Arkabutla Reservoir, etc. It is anticipated that 8,620 acres of woodland will be cleared in the future without the project in the A, B, and C Zones. With the project in effect approximately 24,233 additional acres of woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping units 1 and 6. These are the soils that will benefit most from additional and improved drainage facilities.

Most of the woodland area is included in farm holdings and generally occupy the lower lying land. There is no dedicated woodland within the project area. The woodland is in a generally poor condition due to heavy cutting and past fires. However recovery from logging and fires has been good and with good management practices, the woodland of the area would produce excellent yields. About 5 percent of the woodland area has been in cultivation in the past and has reverted back to woods due to flooding and poor drainage.

Farm Drainage Systems and Cost:

Tables VII contain estimates of amounts and costs of farm drainage systems by soil mapping units that will be constructed after a satisfactory group drainage system and adequate major outlets are developed. These estimates anticipate that 76 percent of the gross open land will be drained and used for crops and pasture production with the project in effect. Approximately 23 percent will remain as wet land due to lack of farmer participation. The remainder will be utilized in road, farmsteads, etc. It is estimated that approximately 34 percent of the present openland is adequately drained.

Cost includes the installation (construction, engineering and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements vary by soil mapping units and land use. Drainage requirements for rotated pasture land were the same as crop land on similar soil units. Cost includes all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates are based on standard design data for conditions involved.

Farm drainage systems capital cost have been amortized for a useful life period of ten years at 5 percent. The life expectancy of farm drainage systems is influenced by soil units, stability of agriculture in the study area, and the cropping pattern, which is largely determined by the soil units. It was determined from a weighted average of all soils that the life expectancy is approximately 10 years. Maintenance cost, varying by soil mapping units and land use, have been added to the amortized annual equivalent of installation cost to determine the cost of farm drainage systems. Farm drainage systems and cost were determined for both A and B Zones. Present costs of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost was established on a project wide basis. Any group drainage ditches running through Zone C was for the purpose of tying in Zones A and B with major drainage outlets now prevailing or proposed in the project.

Approximately 178 miles of group drainage ditches are now in place and will require cleanout and maintenance only to furnish adequate ditches for farm drainage systems now existing and anticipated without the proposed project works of improvement.

Channel enlargement on approximately 36 miles of ditches and the construction of 11 miles of new ditches will be required to give adequate group facilities for the farm drainage systems anticipated with the proposed works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structure. Installation cost have been amortized for a useful life period of 20 years at 3½%. This useful life is based on knownlife of comparable ditches in the immediate vicinity. Maintenance cost have been added to this amount to derive the total annual cost of group drainage systems. Present group drainage systems are expected to prevail under future with project conditions .

Benefits and Associated costs:

Net enhancement benefits which will accrue from the project works of improvement will be improvements in farm and group drainage systems, and improved management and better use of technological advancement as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting in better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual returns and benefits from Table V; (2) annual costs of making land conversions from Table VI; (30 annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag used was 20 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual installation and maintenance costs of farm drainage systems have been discounted to take into account the following considerations: (1) interest rate 5%, (2) Time lag 15 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 15 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of group drainage systems have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 10 years, and (3) period of analysis 50 years.

The lags described are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress towards realization of full benefits from proposed project works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 10 years from the last year of project installation.

2. Land conversions and the complete installation of farm drainage systems is expected to take 5 years after installation of group drainage systems or 15 years after project installation.

3. Realization of maximum yields and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed or a total of 20 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of lag, and to level off at the end of the period of lag and continue at a constant rate to the end of the project life of 50 years.

Summary

The installation of authorized and planned works of improvement will provide almost full protection on 39,220 acres of land and partial protection on 8,520 acres. In addition there will be adequate outlets for farm and group drainage facilities on approximately 155,040 acres of land within the project.

It is anticipated that as a result of works of improvement the areas subject to flooding will be reduced materially and that agricultural development will proceed rapidly.

As a result of agricultural development within the project due to increased drainage facilities, there will be an annual gross benefit of $549,620; annual associated cost of $195,286; with an annual net benefit to project of $354,334.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

TABLE I
Existing Land Use by Soil Mapping Units

Zone A - Drainage Calculations Only

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
1	42,246	21,289	63,535
1S	3,615	1,929	5,544
2	1,048	293	1,341
2S	934	0	934
4	11,902	124	12,026
4S	2,515	508	3,023
6	14,298	1,286	15,584
6S	9,974	3,086	13,060
7	488	45	533
Urban			240
Subtotal-All Soils	87,020	28,560	115,820

Zone B - Drainage and Flood Control Calculations

1	4,805	18,416	23,221
1S	5,551	2,968	8,519
2S	100	0	100
4S	398	686	1,084
6	337	70	407
6S	3,509	1,960	5,469
Water			420
Subtotal-All Soils	14,700	24,100	39,220

Zone C - Zone of No Project Benefit

1	863	1,963	2,826
1S	977	3,544	4,521
6S	570	533	1,103
Water			70
Subtotal-All Soils	2,410	6,040	8,520

Total - Project	104,130	58,700	163,560

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE II A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	49,782			
	Crops	44,803			
	Cotton	11,952	Lbs. Lint	307	3,673,280
	Corn	2,380	Bu.	15	35,652
	Soybeans	13,862	Bu.	12	163,578
	Soybeans (Fol.oats)	(4,926)	Bu.	7	34,964
	Small Grains	13,574	Bu.	23	311,212
	Rice	821	Cwt.	24	19,704
	Idle	897			
	Pasture	1,317	Lbs. Beef	125	165,170
	Other 1/	4,979			
	Forest Land	28,560			
		4/			
	Total	78,342			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are durlicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 37,238 acres of land that is already drained and 240 acres of urban area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE III A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	26,671						5/		
	Crops	24,005				4/				
	Cotton	8,148	Lbs.Lint	311	2,536,280	0.318286	807,262	89.79	731,594	75,668
	Corn	1,052	Bu.	21	21,894	1.45	31,746	23.13	24,334	7,412
	Soybeans	6,709	Bu.	14	95,142	2.35	223,584	20.86	139,935	83,649
	Soybeans (Fol.oats)	(4,116)	Bu.	9	35,178	2.35	82,669	14.19	58,411	24,258
	Small Grains	5,281	Bu.	24	124,492	0.95	118,267	18.68	98,629	19,638
	Idle	480				6/				
	Pasture	2,335	Lbs. Beef	140	326,750	0.1805	58,979	12.99	30,341	28,638
	Other 1/	2,666								
	Forest Land	7,677				7.79	59,805	5.26	40,382	19,423
		7/								
	Total	34,348					1,382,312		1,123,626	258,686

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 69,734 acres of openland that will be drained without the project, or will remain undrained; 11,498 acres that will remain in woods and 240 acres of urban area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	34,348						5/		
	Crops	30,914				4/				
	Cotton	12,986	Lbs.Lint	583	7,566,650	0.318286	2,408,360	151.28	1,964,520	443,840
	Corn	850	Bu.	43	36,306	1.45	52,644	40.43	34,364	18,280
	Soybeans	7,365	Bu.	26	193,893	2.35	455,648	34.12	251,257	204,391
	Soybeans (Fol.oats)	(4,521)	Bu.	16	72,513	2.35	170,405	26.57	120,130	50,275
	Small Grains	6,142	Bu.	41	252,212	0.95	239,600	27.52	169,057	70,543
	Idle	620				6/				
	Pasture	2,951	Lbs.Beef	258	761,150	0.1805	137,387	24.24	71,528	65,859
	Other 1/	3,434								
		7/								
	Total	34,348					3,464,044		2,610,856	853,188

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calculated from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 69,734 acres of openland that will be drained without the project or will remain undrained, 11,498 acres that will remain in woods and 240 acres of urban area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	14,700			
	Crops	13,230			
	Cotton	3,203	Lbs. Lint	391	1,252,440
	Corn	688	Bu.	17	11,988
	Soybeans	5,246	Bu.	17	90,850
	Soybeans (Fol.oats)	(976)	Bu.	11	10,331
	Small Grains	1,890	Bu.	32	61,168
	Rice	130	Cwt.	25	3,250
	Idle	264			
	Pasture	1,809	Lbs. Beef	160	289,810
	Other 1/	1,470			
	Forest Land	24,100			
		4/			
	Total	38,800			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 420 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE III B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	17,322						5/		
	Crops	15,590				4/				
	Cotton	5,173	Lbs.Lint	496	2,566,430	0.318286	816,860	133.02	688,131	128,729
	Corn	895	Bu.	33	29,438	1.45	42,686	34.57	30,943	11,743
	Soybeans	4,405	Bu.	25	109,793	2.35	258,013	32.18	141,741	116,272
	Soybeans (Fol.oats)	(1,429)	Bu.	15	21,697	2.35	50,988	28.48	40,701	10,287
	Small Grains	2,586	Bu.	36	93,572	0.95	88,893	25.05	64,782	24,111
	Idle	313				6/				
	Pasture	2,218	Lbs. Beef	228	506,320	0.1805	91,390	21.56	47,814	43,576
	Other 1/	1,732								
	Forest Land	13,071				8.13	106,268	5.32	69,537	36,731
		7/								
	Total	30,393					1,455,098		1.083,649	371,449

1/Farmsteads, farm roads, waste and non-agricultural.
2/Parenthetical amounts are duplicated acreages.
3/Calculated from columns 3 and 6; rounded to nearest unit.
4/Composite price for lint and seed per pound of lint cotton.
5/Calcula ted from columns 3 and 10; rounded to nearest cent.
6/Composite value of veal calves and herd culls (beef cattle).
7/Total does not include 8,407 acres that will remain in woodland and 420 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	30,393						5/		
	Crops	27,354				4/				
	Cotton	13,082	Lbs.Lint	489	6,391,120	0.318286	2,231,542	129.85	1,857,746	373,796
	Corn	1,583	Bu.	36	56,744	1.45	82,278	36.96	58,501	23,777
	Soybeans	5,260	Bu.	26	135,643	2.35	318,760	33.93	178,485	140,275
	Soybeans (Fol.oats)	(1,805)	Bu.	16	27,997	2.35	65,793	26.44	47,725	18,068
	Small Grains	3,700	Bu.	39	143,762	0.95	136,573	26.39	97,660	38,913
	Idle	548				6/				
	Pasture	3,181	Lbs.Beef	245	780,060	0.1805	140,803	23.27	74,013	66,790
	Other 1/	3,039								
		7/								
	Total	30,393					2,975,749		2,314,130	661,619

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns e and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total does not include 3,407 acres that will remain in woodland and 420 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE II C
(Zone of no Project Benefit)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/			
All	Open Land	2,410			
	Crops	2,169			
	Cotton	418	Lbs.Lint	373	156,020
	Corn	116	Bu.	16	1,890
	Soybeans	1,172	Bu.	17	19,393
	Soybeans (Fol.oats)	(65)	Bu.	10	656
	Small Grains	117	Bu.	31	3,668
	Idle	44			
	Pasture	302	Lbs. Beef	152	45,890
	Other 1/	241			
	Forest Land	426			
		3/			
	Total	2,836			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Total does not include 5,614 acres of land that will remain in woodland and 70 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

SUMMARY - TABLE III C
(Zone of no Project Benefit) 2/
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		3/		4/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	2,836						6/		
	Crops	2,553				5/				
	Cotton	666	Lbs.Lint	471	313,560	0.318286	99,802	127.16	84,688	15,114
	Corn	148	Bu.	30	4,368	1.45	6,334	31.60	4,677	1,657
	Soybeans	977	Bu.	24	23,664	2.35	55,610	30.85	30,138	25,472
	Soybeans (Fol.oats)	(176)	Bu.	15	2,640	2.35	6,204	24.41	4,296	1,908
	Small Grains	273	Bu.	37	9,994	0.95	9,494	25.27	6,898	2,596
	Idle	50				7/				
	Pasture	439	Lbs.Beef	215	94,380	0.1805	17,035	20.45	8,977	8,058
	Other 1/	283								
		8/								
	Total	2,836					194,479		139,674	54,805

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Data is same for both "With project" and "Without project" conditions; no Table IV C required.
3/ Parenthetical amounts are duplicated acreages.
4/ Calculated from columns 3 and 6; rounded to nearest unit.
5/ Composite price for lint and seed per pound of lint cotton.
6/ Calculated from columns 3 and 10; rounded to nearest cent.
7/ Composite value of veal calves and herd culls (beef cattle).
8/ Total does not include 5,614 acres of land that will remain in woodland and 70 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) (4) (5) Future Without Project (Production in Dollars) Gross	Cost	Net	(6) (7) (8) Future With Project (Production in Dollars) 3/ Gross	Cost	Net	(9) Difference In Net Value
Zone A								
1	24,132	747,647	640,554	107,093	2,170,732	1,645,929	524,803	417,710
1S	2,157	124,159	86,742	37,417	204,139	148,084	56,055	18,638
2	221	12,956	9,802	3,154	25,779	18,729	7,050	3,896
2S	90	8,916	6,425	2,491	10,705	7,769	2,936	445
4	1,084	129,148	97,708	31,440	211,301	151,262	60,039	28,599
4S	396	32,358	23,487	8,871	78,596	56,693	21,903	13,032
6	4,363	220,667	179,417	41,250	521,780	399,137	122,643	81,393
6S	1,863	103,298	76,945	26,353	233,787	177,846	55,941	29,588
7	42	3,163	2,546	617	7,225	5,407	1,818	1,201
1/ Subtotal	34,348	1,382,312	1,123,626	258,686	3,464,044	2,610,856	853,188	594,502
Zone B & C:								
1	17,552	516,380	406,617	109,763	1,492,136	1,199,763	292,373	182,610
1S	8,762	618,214	445,432	172,782	870,392	656,221	214,171	41,389
2S	100	8,976	5,971	3,005	12,208	8,736	3,472	467
4S	921	72,214	50,974	21,240	171,654	123,498	48,156	26,916
6	385	26,256	19,859	6,397	38,385	29,095	9,290	2,893
6S	5,509	407,537	294,470	113,067	585,453	436,491	148,962	35,895
2/ Subtotal	33,229	1,649,577	1,223,323	426,254	3,170,228	2,453,804	716,424	290,170
TOTAL	67,577	3,031,889	2,346,949	684,940	6,634,272	5,064,660	1,569,612	884,672

1/ Total area of Zone A reduced by 240 acres of urban area and 81,232 acres not anticipated to receive drainage benefits from the project.

2/ Total area of Zones B and C reduced by 490 acres of water area and 14,021 acres that will remain in woodland.

3/ Includes Zone C which is assumed to be the same as Future Conditions Without Project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

TABLE VI

LAND CONVERSIONS WITH PROJECT

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

(1) Type of Conversion 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55.00	12.50	xx	xx	67.50
W to IC	xx	-		xx		
W to P	xx	55.00	5.00	42.00	xx	102.00
P to GC	xx	xx	5.00	xx	xx	5.00
P to IC	xx	xx		xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx			
Total per acre	xx					
Project						
W to GC	6,278	345,290	78,475	xx	xx	423,765
W to IC	-			xx		
W to P	630	34,650	3,150	26,460	xx	64,260
P to GC	14	xx	70	xx	xx	70
P to IC	-	xx		xx		
GC to IC	-	xx	xx	xx		
GC to P	-	xx	xx			
Total project	xx					488,095
Annual amortized value 2/	xx	xx	xx	xx	xx	26,738
Annual maintenance	xx	xx	xx	xx	xx	5,456
Total annual cost of conversions	xx	xx	xx	xx	xx	32,194

1/ W--woodland; GC--general dry-farmed crops; IC--irrigated crops (rice); P--pasture.
2/ Amortized over 50-year period at 5 percent. (.05478)

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost 2/ installation	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	1 General Crops	20,090	374,780	48,534	43,244	91,778
	1 Pasture	1,629	17,047	2,208	393	2,601
	1S General Crops	1,794	33,467	4,334	3,862	8,196
	1S Pasture	146	1,528	198	35	233
	2 General Crops	194	3,089	400	356	756
	2 Pasture	5	52	7	1	8
	2S General Crops	79	1,258	163	145	308
	2S Pasture	2	21	3	0	3
	4 General Crops	970	12,610	1,633	1,455	3,088
	4 Pasture	6	32	4	1	5
	4S General Crops	351	4,563	591	526	1,117
	4S Pasture	2	11	1	1	2
	6 General Crops	3,786	52,171	6,756	8,026	14,782
	6 Pasture	141	1,484	192	114	306
	6S General Crops	1,623	22,365	2,896	3,441	6,337
	6S Pasture	54	568	74	44	118

(Continued on next page)

Zone	Soil Mapping unit and land use	Area 1/	Total cost 2/ installation	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A (cont)	7 General Crops	38	618	80	71	151
	Subtotal	30,910	525,664	68,074	61,715	129,789
B	1 General Crops	8,471	158,027	20,464	18,234	38,698
	1 Pasture	687	7,189	931	166	1,097
	1S General Crops	3,242	60,480	7,832	6,978	14,810
	1S Pasture	263	2,752	356	64	420
	2S General Crops	28	446	58	51	109
	2S Pasture	1	11	1	0	1
	4S General Crops	157	5,941	769	686	1,455
	4S pasture	3	17	2	0	2
	6 General Crops	134	1,846	239	284	523
	6 Pasture	3	31	4	2	6
	6S General Crops	1,576	21,718	2,812	3,341	6,153
	6S Pasture	39	411	53	31	84
	Subtotal	14,903	258,869	33,521	29,837	63,358
	TOTAL	45,813	784,533	101,595	91,552	193,147

1/ Does not include 10% other lands.
2/ Includes engineering and contingency.
3/ Amortized at 10 years at 5%.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu. Yd.	1,235,775	.15	185,366
Spreading Spoil	Cu. Yd.	818,695	.03	24,561
Clearing right-of-way	Ac.	138	75.00	10,350
Right-of-way easements	Ac.	665	131.17	87,225
Crossings	Ft.	164	40.00	6,560
Clearing and Snagging	Ac.	107	300.00	32,100
Total construction cost	xx	xx	xx	335,912
Engineering cost	xx	xx	xx	33,591
Contingencies and legal	xx	xx	xx	33,591
Total installation cost				403,094
Annual equivalent - installation cost (amortized for 20 years at 3½ percent)				28,362
Annual maintenance cost				16,796
Total annual cost of required group facilities				45,158

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: White Oak Bayou
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS
AND ASSOCIATED COSTS

(1) Item	(2) Total Dollars	(3) Discounted amount Dollars
1. Net return with project	1,569,612	
2. Net return without project	684,940	
3. Gross benefit to project	884,672	549,620 1/
4. Farm drainage cost		
a. Installation cost	101,595	
b. Maintenance cost	91,552	
c. Total	193,147	135,247 2/
5. Group drainage cost		
a. Installation cost	28,362	
b. Maintenance cost	16,796	
c. Total	45,158	37,496 3/
6. Conversion cost		
a. Installation cost	26,738	
b. Maintenance cost	5,456	
c. Total	32,194	22,543 2/

1/ Discount factor for 20 years @ 5% - .62127
2/ Discount factor for 15 years @ 5% - .70023
3/ Discount factor for 10 years @ 3½%- .83033



LOCATION MAP

YAZOO HEADWATER PROJECT

WHITE OAK BAYOU AREA

MISSISSIPPI

SCALE 1:250,000

VII. McKINNEY BAYOU

Description of Area

McKinney Bayou is located in the northwest part of Tunica County. The southernmost portion of the project is approximately three miles due west of the town of Tunica. The east bank of the Mississippi River levee forms the western boundary of the project, while the eastern boundary follows in a large part the Yazoo & Mississippi Valley Railroad.

The project contains 23,850 acres of which 19,060 are cleared and 4,790 acres are wooded.

Of the 23,850 acres approximately 18,040 acres or 76 percent are above the limits of maximum overflow (A Zone); 3,710 acres or 15 percent are between the maximum overflow and the three-year frequency with project in operation (B Zone); and 2,100 acres or 9 percent is below the three-year frequency (C Zone). All of the C Zone is in woods.

Soils and Topography:

Within the A Zone approximately 17 percent of the soils are level, very poorly drained heavy clays; 42 percent on nearly level to gently sloping, moderately well drained clay loams; 40 percent on nearly level to gently sloping well drained sandy loams and 1 percent excessively drained sands.

Within the B Zone approximately 61 percent of the soils are level, very poorly drained heavy clays; 29 percent nearly level to gently sloping, moderately well drained clay loams; and the remaining 10 percent nearly level, well drained sandy loam soils.

The C Zone is composed almost entirely of very poorly drained, heavy clay soils or in low, wet forested areas (swamp).

Problems Within the Project

Drainage for the area is dependent upon the pumping plant located where McKinney Bayou makes contact with the Mississippi River levee. The capacity of this plant has not been sufficient to provide adequate farm drainage for the area. As a result land within the B Zone has not been utilized to the extent it could have had better drainage been provided. Flooding of cropland and delayed planting of desired crops are the major problems under existing conditions.

Existing Works of Improvement

The existing works of improvement consists of a pumping plant with a capacity of 100 c.f.s.

Proposed Plan of Improvement

The project provided for replacement of the present pumping plant with a new plant of 300 c.f.s. capacity.

Effects of Proposed Plan for Improvement and Development of Area:

The proposed plan will afford protection from floodwater damages in the B Zone. This protection and works of improvement will also provide adequate facilities for farm drainage, increase the level of management and extend the development of wooded areas for row crops and pasture in the B Zone.

Land Use:

At present approximately 80 percent of the entire project area is open land, 19 percent is woodland and 1 percent is water area. Most of the woodland is found in soil mapping unit 1.

A very small amount of woodland clearing is going on in the project at present. It is estimated that 351 acres of woodland will be cleared in the future without the project in the A and B Zones. With the project in effect approximately 1,391 additional acres of woodland will be cleared and put into crops and pasture. Most of the land clearing is expected to occur in soil mapping unit number 1.

There is no dedicated woodland in the area.

Approximately 25 percent of the woodlands are now under a moderate to high level of forest management. On about 60 percent of the woodland area cutting has been severe and destructive. Most of the woodland occupies good sites and with proper management will respond favorably.

Farm drainage systems and cost:

Table VII contains estimates of amounts and cost of farm drainage systems by soil mapping units that will be constructed after satisfactory group drainage systems and adequate major outlets are developed. These estimates anticipate that in the A Zone 89 percent and in the B Zone 77 percent of the gross open land will be drained and used for crops and pasture production with the project in effect. Approximately 9 percent in the A Zone and 18 percent in the B Zone will remain as wet land due to the lack of farmer participation. The remainder will be utilized in roads, farmsteads, etc. It is estimated that approximately 59 percent in the A Zone and 35 percent in the B Zone of the present open land is adequately drained.

Cost includes the installation (construction, engineering and contingencies) required for farm drainage systems for the satisfactory removal of surface water to obtain the best crop production. Requirements vary by soil mapping units and land use. Drainage requirements for rotated pasture land were the same as cropland on similar soil units. Cost includes all ditching and appurtenant structural needs for systems to serve an average of one square mile. Estimates were based on standard design data for conditions involved.

Farm drainage systems capital cost have been amortized for a useful life period of ten years at 5 percent. The life expectancy of

farm drainage systems is influenced by soil units, cropping patterns, which are largely determined by soil units, and the stability of agriculture in the study area. It was determined from a weighted percentage of all soil units that the life expectancy is approximately 10 years. Maintenance cost, varying with soil mapping units and land use, have been added to the Amortized annual equivalent of installation cost to derive the annual cost of farm drainage systems. Farm drainage systems and cost were determined for the A and B Zones. Present cost of farm drainage systems are expected to prevail under future with project conditions.

Group Drainage Systems and Cost:

Group drainage systems and cost was established on a project wide basis. Any group drainage ditches running through Zone C were for the purpose of tying in Zones A and B with major drainage outlets proposed in the project.

Approximately 35 miles of group drainage ditches are now in place and will require cleanout and maintenance only to furnish adequate ditches for farm drainage systems now existing and anticipated without the proposed project works of improvements.

Channel enlargement on approximately 7 miles of ditches and lowering the gradient of approximately 24 miles will be required to give adequate group facilities for farm drainage systems anticipated with the proposed works of improvement in place.

Table VIII itemizes the cost required to install and maintain intermediate group drainage facilities and appurtenant structures. Installation costs have been amortized for a useful life period of 20 years at $3\frac{1}{2}$ percent. This useful life is based on known life of comparable ditches in this immediate vicinity. Maintenance costs have been added to this amount to derive the total annual cost of group drainage systems. Present group drainage systems are expected to prevail under future with project conditions.

Benefits and Associated Costs:

Net enhancement benefits which will accrue from the project works of improvement will be improvements in farm and group drainage systems, and improved management and better use of technological advance as a result of improved drainage.

Annual equivalent values of income on woodland has been determined. Due consideration has been given present annual values and deferred income resulting in better management without project. No increase in forest income is anticipated due to project works of improvement.

Table IX summarizes-- (1) net annual returns and benefits from Table V; (2) annual costs of making land conversions from Table VI; (3) annual costs in installing and maintaining farm and group drainage systems, Tables VII and VIII.

Gross project benefits have been discounted to take into account an anticipated time lag in accrual of the last increment of increasing benefits after project installation. The time lag used was 15 years. A 50 year period of analysis was used. A projected private interest rate of 5 percent was used in arriving at discount factors.

Annual installation and maintenance costs of farm drainage systems have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 10 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of conversions have been discounted to take into account the following considerations: (1) interest rate 5%, (2) time lag 10 years, and (3) period of analysis 50 years.

Annual installation and maintenance costs of group drainage systems have been discounted to take into account the following considerations: (1) interest rate 3½%, (2) time lag 5 years, and (3) period of analysis 50 years.

The lags described are based upon local experience and present trends in this and other similar areas under conditions which parallel those being evaluated. Instantaneous installation of the project is assumed for discount purposes and is considered to be year zero as a reference point for all associated measure costs and benefits contingent upon project installation. Progress towards realization of full benefits from proposed project works of improvement is expected to be incremental and as follows:

1. Complete installation of group drainage facilities is expected to take 5 years from the last year of project installation.

2. Land conversions and the complete installation of farm drainage systems is expected to take 5 years after installation of group drainage systems or 10 years after project installation.

3. Realization of maximum estimated yields and full benefits is expected to require a 5 year conservation build-up period after land conversions are made and farm drainage systems installed or a total of 15 years after project installation.

A proportionate part of all associated costs and of project benefits is assumed to accrue the first year after instantaneous project installation, to increase uniformly for the period of lag, and to level off at the end of the period of lag and continue at a constant rate to the end of the project life of 50 years.

Summary

The installation of planned works of improvement will provide almost full protection from floodwater damage on 3,710 acres of land between the 189.0 and 185.0 MSL elevation and partial protection on 1,990 acres of land below the 185.0 MSL elevation. In addition there will be adequate outlet for farm and group drainage facilities on approximately 21,660

acres of land within the project.

It is anticipated that as a result of works of improvement the areas subject to flooding will be reduced materially and that agricultural development within the area will proceed rapidly.

As a result of agricultural development within the project due to increased drainage facilities there will be an annual gross benefit of $61,437; annual associated cost of $30,568; with an annual net benefit to project of $30,869.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

TABLE I
Existing Land Use by Soil Mapping Units

Zone A - Drainage Calculations Only

Soil Mapping Unit	Open (Acres)	Wooded (Acres)	Total (Acres)
1	2,573	464	3,037
2	2,801	80	2,881
2S	2,315	280	2,595
2U	2,080	0	2,080
4	518	0	518
4S	923	5	928
5	4,298	71	4,369
5S	1,344	10	1,354
12U	188	0	188
Water			90
Subtotal-All soils	17,040	910	18,040
Zone B - Drainage and Flood Control Calculations			
1	1,170	1,663	2,833
2	28	0	28
2S	166	117	283
2U	373	0	373
4	110	0	110
5	83	0	83
Subtotal-All Soils	1,930	1,780	3, 710
Zone C - Zone of no Project Benefit			
1	90	1,562	1,652
2S	45	28	73
4	20	0	20
14	0	245	245
Water			110
Subtotal-All Soils	155	1,835	2,100
Total - Project	19,125	4,525	23,850

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE II A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Per Acre	(6) Total
		2/		3/	
All	Open Land	6,864			
	Crops	6,176			
	Cotton	2,249	Lbs. Lint	410	922,240
	Corn	325	Bu.	30	9,761
	Soybeans	1,940	Bu.	17	33,800
	Soybeans (Fol.oats)	(398)	Bu.	9	3,734
	Small Grains	1,314	Bu.	29	38,244
	Idle	124			
	Pasture	224	Lbs. Beef	147	32,940
	Other 1/	688			
	Forest Land	910			
		4/			
	Total	7,774			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 10,176 acres of land that is already drained and 90 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE III A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	3,270						5/		
	Crops	2,943				4/				
	Cotton	1,314	Lbs.Lint	457	600,110	0.318286	191,008	119.76	157,366	33,642
	Corn	133	Bu.	37	4,986	1.45	7,229	32.58	4,333	2,896
	Soybeans	714	Bu.	22	15,683	2.35	36,856	26.90	19,207	17,649
	Soybeans(Fol.oats)	(249)	Bu.	11	2,784	2.35	6,542	18.37	4,574	1,968
	Small Grains	486	Bu.	29	14,272	0.95	13,559	21.61	10,502	3,057
	Idle	59				6/				
	Pasture	237	Lbs.Beef	146	34,600	0.1805	6,246	13.54	3,210	3,036
	Other 1/	327								
	Forest Land	287				9.39	2,695	6.13	1,759	936
		7/								
	Total	3,557					264,135		200,951	63,184

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest uhit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total area reduced by 14,393 acres that will not receive drainage benefits from project and 90 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE IV A
(Zone for Drainage Calculations Only)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	3,557								
	Crops	3,201				4/				
	Cotton	1,607	lbs.Lint	693	1,113,210	0.318286	354,319	170.47	273,942	80,377
	Corn	118	Bu.	60	7,058	1.45	10,234	49.86	5,884	4,350
	Soybeans	677	Bu.	31	20,661	2.35	48,553	36.90	24,982	23,571
	Soybeans(Fol.oats)	(234)	Bu.	17	4,086	2.35	9,602	28.12	6,580	3,022
	Small Grains	509	Bu.	45	22,652	0.95	21,519	29.24	14,884	6,635
	Idle	64				6/				
	Pasture	226	lbs.Beef	275	62,180	0.1805	11,223	25.56	5,777	5,446
	Other 1/	356								
		7/								
	Total	3,557					455,450		332,049	123,401

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total area reduced by 14,393 acres that will not receive drainage benefits from project, and 90 acres of water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE II B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	1,930			
	Crops	1,737			
	Cotton	397	Lbs. Lint	376	149,130
	Corn	126	Bu.	25	3,210
	Soybeans	739	Bu.	17	12,862
	Soybeans (Fol.oats)	(129)	Bu.	10	1,327
	Small Grains	294	Bu.	30	8,866
	Idle	35			
	Pasture	146	Lbs. Beef	144	20,960
	Other 1/	193			
	Forest Land	1,780			
	Total	3,710			

1/ Farmsteads, farm roads , waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE III B
(Zone For Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	2,025						5/		
	Crops	1,823				4/				
	Cotton	598	Lbs.Lint	500	298,880	0.318286	95,130	132.72	79,365	15,765
	Corn	127	Bu.	38	4,798	1.45	6,957	36.59	4,647	2,310
	Soybeans	575	Bu.	23	13,473	2.35	31,660	30.80	17,711	13,949
	Soybeans(Fol.oats)	(146)	Bu.	13	1,948	2.35	4,578	22.93	3,348	1,230
	Small Grains	305	Bu.	33	10,012	0.95	9,512	23.36	7,124	2,388
	Idle	38				6/				
	Pasture	180	Lbs. Beef	197	35,380	0.1805	6,386	18.59	3,346	3,040
	Other 1/	202								
	Forest Land	1,027				9.39	9,644	6.13	6,295	3,349
	Total 7/	3,052					163,867		121,836	42,031

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest unit.
6/ Composite value of veal calves and herd culls (beef cattle).
7/ Total does not include 658 acres of land that will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE IV B
(Zone for Drainage and Flood Control Calculations)
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITH PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		2/		3/		Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	3,050								
	Crops	2,747				4/				
	Cotton	1,349	Lbs.Lint	544	733,340	0.313286	233,412	142.55	192,304	41,108
	Corn	197	Bu.	42	8,306	1.45	12,045	39.82	7,844	4,201
	Soybeans	568	Bu.	25	14,361	2.35	33,747	33.30	18,917	14,830
	Soybeans(Fol.oats)	(142)	Bu.	14	2,001	2.35	4,702	24.51	3,481	1,221
	Small Grains	321	Bu.	37	11,962	0.95	11,364	25.59	8,214	3,150
	Idle	57				6/				
	Pasture	255	Lbs. Beef	233	59,520	0.1805	10,744	22.36	5,702	5,042
	Other 1/	305								
	Total 7/	3,052					306,014		236,462	69,552

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Composite price for lint and seed per pound of lint cotton.
5/ Calculated from columns 3 and 10; rounded to nearest cent.
6/ Composite value of veal calves and herd culls (Beef cattle).
7/ Total does not include 658 acres of land that will remain in woods.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE II C
(Zone of no Project Benefit)
COMPUTATION OF AGRICULTURAL PRODUCTION

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total
		2/		3/	
All	Open Land	155			
	Crops	140			
	Cotton	17	Lbs. Lint	370	6,290
	Corn	8	Bu.	31	246
	Soybeans	87	Bu.	15	1,292
	Soybeans (Fol.oats)	(1)	Bu.	13	13
	Small Grains	1	Bu.	40	40
	Idle	3			
	Pasture	24	Lbs. Beef	136	3,260
	Other 1/	15			
	Total	4/ 155			

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Parenthetical amounts are duplicated acreages.
3/ Calculated from columns 3 and 6; rounded to nearest unit.
4/ Total does not include 1,835 acres of land that will remain in woods and 110 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

SUMMARY - TABLE III C
(Zone of no Project Benefit) 2/
COMPUTATION OF AGRICULTURAL PRODUCTION, VALUE OF PRODUCTION, PRODUCTION COSTS, AND NET RETURNS: FUTURE CONDITIONS WITHOUT PROJECT (Based on projected prices)

(1) Soil Unit	(2) Land Use and Crop Distribution	(3) Acres	(4) Production Unit	(5) Production Per Acre	(6) Production Total	(7) Value of Production Per Unit	(8) Value of Production Total	(9) Cost of Production Per Acre	(10) Cost of Production Total	(11) Net Return
		3/				Dollars	Dollars	Dollars	Dollars	Dollars
All	Open Land	155		4/		5/		6/		
	Crops	140								
	Cotton	24	Lbs.Lint	519	12,450	0.318286	3,962	135.67	3,256	706
	Corn	7	Bu.	45	318	1.45	462	41.14	288	174
	Soybeans	81	Bu.	23	1,847	2.35	4,341	30.10	2,438	1,903
	Soybeans(Fol.oats)	(1)	Bu.	23	23	2.35	54	35.00	35	19
	Small Grains	1	Bu.	48	48	0.95	46	31.00	31	15
	Idle	3				7/				
	Pasture	24	Lbs.Beef	167	4,000	0.1805	722	15.54	373	349
	Other 1/	15								
	Total 8/	155					9,587		6,421	3,166

1/ Farmsteads, farm roads, waste and non-agricultural.
2/ Data is same for both "With project"and "Without Project" conditions; no Table IV C required.
3/ Parenthetical amounts are duplicated acreages.
4/ Calculated from columns 3 and 6; rounded to nearest unit.
5/ Composite price for lint and seed per pound of lint cotton.
6/ Calculated from columns 3 and 10; rounded to nearest cent.
7/ Composite value of veal calves and herd culls (beef cattle).
8/ Total does not include 1,835 acres of land that will remain in woods and 110 acres in water area.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

TABLE V

PROJECT AREA SUMMARY BY SOIL MAPPING UNITS

(1) Soil Unit	(2) Acres	(3) Future Without Project (Production in Dollars) Gross	(4) Cost	(5) Net	(6) Future With Project (Production in Dollars) 3/ Gross	(7) Cost	(8) Net	(9) Difference In Net Value
Zone A								
1	938	30,873	26,437	4,436	84,398	63,999	20,399	15,963
2	784	54,370	41,271	13,099	91,730	66,692	25,038	11,939
2S	571	50,166	36,131	14,035	68,429	49,525	18,904	4,869
2U	466	33,409	25,374	8,035	54,391	39,672	14,719	6,684
4	53	6,402	4,859	1,543	10,358	7,416	2,942	1,399
4S	110	15,139	11,032	4,107	21,830	15,716	6,114	2,007
5	497	54,848	42,010	12,838	96,912	69,294	27,618	14,780
5S	138	18,928	13,837	5,091	27,402	19,735	7,667	2,576
1/ Subtotal	3,557	264,135	200,951	63,184	455,450	332,049	123,401	60,217
Zone B & C								
1	2,291	87,014	68,987	18,027	195,687	157,072	38,615	20,588
2	28	2,354	1,634	720	3,213	2,336	877	157
2S	302	20,787	13,624	7,163	35,070	24,731	10,339	3,176
2U	373	30,966	21,311	9,655	43,245	31,541	11,704	2,049
4	130	19,447	13,576	5,871	22,918	16,178	6,740	869
5	83	12,886	9,125	3,761	15,468	11,025	4,443	682
Subtotal 2/	3,207	173,454	128,257	45,197	315,601	242,883	72,718	27,521
TOTAL	6,764	437,589	329,208	108,381	771,051	574,932	196,119	87,738

1/ Total area of Zone A reduced by 14,393 acres that will not receive drainage benefits from project and 90 acres of water area.

2/ Total area of Zone B and C reduced by 2,493 acres that will receive drainage benefits from project and 110 acres of water area.

3/ Includes Zone C which is assumed to be the same as Future Conditions Without Project.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou

TABLE VI

LAND CONVERSIONS WITH PROJECT

(1) Type of Conversions 1/	(2) Total amount	(3) Cost of clearing	(4) Cost of smoothing	(5) Cost of pasture establishment	(6) Cost of irrigation system	(7) Total cost
	Acres	Dollars	Dollars	Dollars	Dollars	Dollars
Per Acre						
W to GC	xx	55.00	12.50	xx	xx	67.50
W to IC	xx			xx		
W to P	xx	55.00	5.00	40.00	xx	100.00
P to GC	xx	xx	5.00	xx	xx	5.00
P to IC	xx	xx		xx		
GC to IC	xx	xx	xx	xx		
GC to P	xx	xx	xx			
Total per acre	xx					
Project						
W to GC	1,157	63,635	14,462	xx	xx	78,097
W to IC						
W to P	94	5,170	470	3,760	xx	9,400
P to GC	30	xx	150	xx	xx	150
P to IC		xx		xx		
GC to IC		xx	xx	xx		
GC to P		xx	xx			
Total project	xx					87,647
Annual amortized value 2/	xx	xx	xx	xx	xx	4,801
Annual maintenance	xx	xx	xx	780	xx	780
Total annual cost of conversions	xx	xx	xx	xx	xx	5,581

1/ W--woodland; GC--general dry-farmed crops; IC--irrigated crops (rice); P--pasture.
2/ Amortized over 50-year period at 5 percent (.05478).

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

TABLE VII
ANALYSIS OF FARM DRAINAGE SYSTEM COSTS

Zone	Soil Mapping unit and land use	Area 1/	Total cost 2/ installation	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
A	1 General Crops	781	14,569	1,887	1,681	3,568
	1 Pasture	63	659	85	15	100
	2 General Crops	689	10,972	1,421	1,266	2,687
	2 Pasture	17	178	23	4	27
	2S General Crops	502	7,995	1,035	922	1,957
	2S Pasture	12	126	16	3	19
	2U General Crops	409	6,513	843	752	1,595
	2U Pasture	10	104	14	2	16
	4 General Crops	48	624	81	72	153
	4 Pasture	0				
	4S General Crops	98	1,274	165	147	312
	4S Pasture	1	5	1	0	1
	5 General Crops	444	5,772	747	666	1,413
	5 Pasture	3	17	2	0	2
	5S General Crops	123	1,599	207	184	391
	5S Pasture	1	5	1	0	1
	Subtotal	3,201	50,412	6,528	5,714	12,242

(Continued on next page)

TABLE VII Continued

Zone	Soil Mapping unit and land use	Area 1/	Total cost 2/ installation	Annual equivalent cost 3/	Annual maintenance cost	Total annual cost
		Acres	Dollars	Dollars	Dollars	Dollars
B	1 General Crops	1,019	19,010	2,462	2,193	4,655
	1 Pasture	83	869	112	20	132
	2 General Crops	7	112	15	13	28
	2S General Crops	103	1,640	212	189	401
	2S Pasture	3	31	4	1	5
	2U General Crops	93	1,481	192	171	362
	2U Pasture	3	31	4	1	5
	4 General Crops	22	314	41	36	77
	5 General Crops	14	182	24	21	45
	Subtotal	1,347	23,670	3,065	2,645	5,710
	TOTAL	4,548	74,082	9,593	8,359	17,952

1/ Does not include 10% other lands.
2/ Includes engineering and contingencies.
3/ Amortized for 10 years at 5%.

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

TABLE VIII
ANALYSIS OF GROUP DRAINAGE NEEDS AND COSTS

Item	Unit	Amount	Unit Cost	Total Cost
			Dollars	Dollars
Excavation	Cu. Yd.	241,911	.15	21,287
Spreading Spoil	Cu. Yd.	79,342	.03	2,380
Clearing right-of-way	Ac.	32	75.00	2,400
Right-of-way easements	Ac.	414	130.43	54,000
Clearing & Snagging	Ac.	52	300.00	15,600
Total construction cost	xx	xx	xx	95,667
Engineering cost	xx	xx	xx	9,567
Contingencies and legal	xx	xx	xx	9,567
Total installation cost				114,801
Annual equivalent - installation cost (amortized for 20 years at 3½ percent)				8,077
Annual maintenance cost				4,783
Total annual cost of required group facilities				12,860

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: McKinney Bayou
State: Mississippi

TABLE IX

SUMMARY OF ANNUAL NET PRODUCTION RETURNS
AND ASSOCIATED COSTS

(1) Item	(2) Total Dollars	(3) Discounted amount Dollars
1. Net return with project	196,119	
2. Net return without project	108,381	
3. Gross benefit to project	87,738	61,437 1/
4. Farm drainage cost		
a. Installation cost	9,593	
b. Maintenance cost	8,353	
c. Total	17,952	14,231 2/
5. Group drainage cost		
a. Installation cost	8,077	
b. Maintenance cost	4,783	
c. Total	12,860	11,835 3/
6. Conversion cost		
a. Installation cost	4,801	
b. Maintenance cost	780	
c. Total	5,581	4,424 2/

1/ Discount factor for 15 years @ 5% - .70023
2/ Discount factor for 10 years @ 5% - .79275
3/ Discount factor for 5 years @ 3½% - .92028

MISSISSIPPI RIVER & TRIBUTARIES STUDY

Basin: Yazoo
Project: Yazoo Headwater
Reach: All
State: Mississippi

TABLE IX
SUMMARY OF ANNUAL NET PRODUCTION RETURNS AND ASSOCIATED COST
FOR ENTIRE PROJECT

(1) Item	(2) Total	(3) Discounted amount
	Dollars	Dollars
1. Net return with project	6,467,463	
2. Net return without project	4,049,563	
3. Gross benefit to project	2,417,900	1,469,318
4. Farm drainage cost		
a. Installation Cost	251,827	
b. Maintenance Cost	228,798	
c. Total	480,625	331,968
5. Group drainage cost		
a. Installation cost	133,631	
b. Maintenance cost	78,188	
c. Total	211,819	178,819
6. Conversion cost		
a. Installation cost	120,901	
b. Maintenance cost	49,024	
c. Total	169,925	116,681



LOCATION MAP

YAZOO HEADWATER PROJECT

McKINNEY BAYOU AREA

MISSISSIPPI

SCALE 1:62,500

REPORT ON
PRESENT AND ANTICIPATED AGRICULTURAL CONDITIONS

YAZOO HEADWATER PROJECT
PART II
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

REPORT ON
PRESENT AND ANTICIPATED
FLOODWATER AND SEDIMENTATION CONDITIONS
YAZOO HEADWATER PROJECT
PART II
BIG SAND CREEK, SUB PROJECT
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

PREPARED BY
U. S. DEPARTMENT OF AGRICULTURE
for the
MISSISSIPPI RIVER COMMISSION

SOIL CONSERVATION SERVICE
JACKSON, MISSISSIPPI
AUGUST, 1957

Purpose and Scope of Study

For many years floodwaters and sediment from tributaries of the Yazoo River Watershed have caused severe hardships, damage, direct loss of life and livestock and improper utilization of the natural resources in the Yazoo-Mississippi Delta.

The purpose of this study is to estimate the extent of such damages on lands and property in the Yazoo-Mississippi alluvial floodplain of Leflore and Carroll Counties affected by floodwaters and sediment from Big Sand Creek, a tributary of the Yazoo River, and the effects of a concentrated flood prevention-soil and water conservation program in the upland portion of this watershed on reductions in peak discharges and sediment into the alluvial floodplain.

While a detailed flood prevention-soil and water conservation plan is being prepared for the upland portion of the watershed to determine reductions in peak discharge, sediment and costs of measures, this plan will not constitute a part of this report. When the plan is completed a copy will be provided as supplemental background material.

Summary

Description of Watershed

Big Sand Creek Watershed lies in Leflore, Carroll and Montgomery Counties. The upland portion comprises 75,507 acres and the alluvial portion approximately 14,000 acres. The creek flows in a westerly direction from its origin east of McCarley in Montgomery County to its confluence with the Yazoo River in Leflore County. The soils in the upland portion are associated with the loess resource area and occur on very steep slopes in the west to moderately steep to steep in the east part of the watershed. Severe sheet and gully erosion occur in the area east of Carrollton. Most of the cropland occurs in the broad valleys; pasture, idle and woodland occur mostly in the hills.

The soils in the alluvial portion range from poorly drained, heavy clays to excessively drained sands. An alluvial cone has built up over a period of years adjacent to the Bluffs and extending westward for several miles. Because of frequent levee breaks along the Big Sand floodway, land and water resources are not utilized to their fullest extent. Farm and group drainage systems are lacking and a low level of farm management exists in the area.

Field Investigations

Hydrology

A rating curve for the gage at Valley Hill provided by the U. S. Army Corps of Engineers indicates that the peak discharge of the maximum storm recorded was 33,000 cfs. This storm was on April 10, 1947.

With proposed land treatment, land stabilization measures and floodwater retarding structures within the watershed the estimated reduction in peak flow would be approximately 52 percent, or 17,000 cfs. This percentage reduction in flow held true for other storms. Land treatment and land stabilization measures would account for approximately 8 percent reduction and floodwater retarding structures 44 percent.

It is estimated that there will be a 56 percent reduction in number of floods in the alluvial floodplain with proposed land treatment, land stabilization measures, and floodwater retarding structures in the watershed.

Sedimentation

The following table will show the source of sediment and estimated annual delivery rate at Valley Hill under existing and anticipated conditions:

Source	Existing Conditions			Future Conditions		
	Estimated Rate			Estimated Rate(Below Struct.)		
	Ac.Ft/Yr.	Tons/Ac/Yr.	Tons/Yr.	Ac.Ft/Yr.	Tons/Ac/Yr.	Tons/Yr.
Gullies & Roads	199.1	9.1	358,660	24.1	1.1	43,040
Sheet	129.7	5.9	233,330	29.9	1.4	53,610
Streambank	392.3	17.8	705,990	117.1	5.3	211,420
Total	721.1	32.8	1,297,980	171.1	7.8	308,070

It is estimated that the planned soil conservation practices and flood prevention measures in the watershed would reduce sediment to the alluvial portion of the watershed by approximately 77 percent. This is equivalent to 550 acre feet per year or 25.0 tons per acre per year. By measures this would be:

Land Treatment	60.4	Ac.Ft/Yr.	2.7	Tons/Ac.Yr.
Land Stabilization	147.0	"	6.7	"
Floodwater Retarding Structures	67.4	"	3.1	"
Streambank protection on the main stem and tributaries	275.2	"	12.5	"
Total Reduction	550.0	"	25.0	"

The extent and degree of sediment damage in the alluvial floodplain was determined by a detailed field study. Conditions noted during this study were the depth of deposition, areal coverage, and land use. From this data and interviews with landowners the weighted loss of production on these areas was determined to be 75 percent.

By comparing extent of damage from 1941 aerial photographs with the field study in September, 1956 the annual rate of damage was 65 acres per year.

1941	1956	Annual Rate
Total Acres Damaged	Total Acres Damaged	
152 Acres	1,070 Acres	65 Acres

Economic

Damages:

Schedules were obtained in the upland portion of the watershed and alluvial floodplain to determine an average annual damage in these areas.

The following table gives source, general location, and estimated amount of damage.

From	Estimated Average Annual Damages (Long-term Projected Prices)		
	Upland	Alluvial Floodplain	Total
Floodwater	$ 5,454	$167,412	$172,866
Sediment	-	57,223	57,223
C&G Railroad	22,943	-	22,943
Land Destruction	26,576	-	26,576
Total	54,973	224,635	279,608

Planned Measures and Estimated Costs:

A land treatment, land stabilization and water control program was planned to meet the objectives as requested by the Corps of Engineers.

Land treatment for watershed protection will consist primarily of conservation crop rotation, terracing, pasture and tree plantings; land treatment for flood prevention and reduction of sediment will consist primarily of revegatation of critical areas in trees, grass and legumes, roadside erosion control, streambank stabilization, overfall structures and desilting basins; waterflow control measures will consist of 14 floodwater retarding structures and 20 miles of diversion ditches and dikes.

Total cost of these measures (1955 prices) is estimated to be $1,381,433 Federal and $669,894 Non-Federal. Annual costs (1955 prices) for flood prevention measures would be:

Measures	Amortization of Installation			Operation and Maintenance			Total Annual Cost
	Federal	Non-Federal	Total	Federal	Non-Federal	Total	
Land Stabilization	6,765	5,822	12,587	1,600	5,224	6,824	19,411
Waterflow Control	31,083	3,784	34,867		2,954	2,954	37,821
Stream Channel Stabilization	7,656	2,571	10,227		904	904	11,131
Total	45,504	12,177	57,681	1,600	8,082	10,682	68,363

Benefits (long-term projected prices) from structural measures will be:

Item (1)	Estimated Average Annual Damage Without Project (2)	Estimated Average Annual Damage Without Structural Measures (3)	Estimated Average Annual Damage With Project (4)	Benefits from Structural Measures (5)
Floodwater	$172,866	$168,597	$83,602	$84,995
Sediment	57,223	57,223	20,058	37,165
Land and Railroad Destruction	49,519	49,519	8,165	41,354
Sub-Total	279,608	275,339	111,825	163,514
Benefits from more intensive use of floodplain				27,659
Total Flood Prevention Benefits				191,173

Description of Watershed

A. Upland Portion - 75,507 Acres

Physical:

Big Sand Creek lies in Carroll and Montgomery Counties and flows in a westerly direction. It is 18 miles long (E-W) and 12 miles across at its widest point near McCarley. From its point of entry into the delta (Valley Hill) to Carrollton the county seat, the watershed is approximately 4 miles wide. Above Carrollton its principal tributaries fan out in typical watershed pattern.

Soils and Topography:

The watershed lies entirely within the Loess Resource area. From Carrollton westward the loess soil is very deep and highly dissected with moderate erosion. East of Carrollton the loess soil decreases in depth, dissection of the landscape lessens, but soil erosion is very severe. Large areas of land have been completely abandoned to advanced stages of erosion; numerous large gullies have penetrated through the

loess soil into the sands and clays of the underlying Coastal Plain formation. The susceptibility of these soils to erosion has been a great factor in the tremendous amount of sediment deposited in the Delta. The valley bottoms are broad with deep wide channels predominant. Channel degrading is prominent in the tributaries and loss of land due to streambank cutting is serious between Valley Hill and McCarley. The loss contributes materially to the total amount of sediment transported to the Delta.

Land Use:

At the present time 46,000 acres or 61% of the land is in trees; 8,200 acres or 11% in pasture; 6,500 acres or 9% idle, 13,600 acres or 18% in cultivation; and 1,200 acres in miscellaneous uses. Of this 13,600 acres in cultivation, approximately 9,000 acres is in bottom land. Approximately 22% of the entire watershed, or 16,600 acres is in bottom lands.

Hydrologic Conditions:

The soils in woodland and pasture are in poor physical condition, due primarily to poor management. Infiltration is slow and runoff rapid. Valley slopes on the tributaries will average 25 feet per mile, while the main stem will average 10 feet per mile in the corridor and 15 feet per mile above Carrollton. The average annual precipitation is 52"; growing season 221 days; and mean temperature ranges from 82 degrees in July to 46 degrees in January.

B. Delta Portion - Approximately 14,000 acres

The present channel of Big Sand Creek in the Delta follows its natural course to approximately 5500 feet west of its entry into the Delta. At this point the Big Sand Drainage District has constructed a channel and levee system to carry the hill waters to the Yazoo River.

Prior to any measures to confine or control this flow of water it is evident that the stream "wandered at will" after entering the alluvial floodplain. Recent soil surveys in the area have revealed stratas of sand and silt at various depth and thickness; also the soils have been influenced by deposits of silt transported from this hill tributary several miles west of the Bluffs.

Since the levees, which confine the flow in the Delta, are built of very unstable material, any storm that will produce a peak discharge of approximately 5,000 cfs will result in breaks in the levees, sand deposited near these breaks, and farm land inundated.

The extent of damage resulting from levee failures will depend on the magnitude of the storm, number and location of levee breaks and season of year. As nearly as can be determined there is no continuity or pattern in levee failures from any magnitude of storm. Information provided by the Corps of Engineers on location and date of levee breaks indicate that over 50% of the breaks occur between the planting and harvesting season for row crops grown in the area.

Of the 14,000 acres in the area, approximately 7% is well drained soils, 83% poorly drained and 6% damaged by sand deposition; approximately 4% is within the levee system.

The cropping pattern is influenced to a large degree by acreage controls, and to a smaller degree, damage to land by sand and flooding. There are approximately 2625 acres of cotton, 1470 acres corn, 2520 acres pasture, 3255 acres soybeans, 3500 acres woods and 630 acres idle or in miscellaneous uses.

Watershed Problems

A. Upland Portion

The agricultural history of the area coupled with the physical characteristics of the watershed have contributed to the rapid deterioration of its natural resources. Much of the fertile hill farm lands have now ceased to produce except at near subsistence levels or have been abandoned altogether. Cultivation of row crops is largely confined to the bottoms or narrow ridge tops. The severely eroded hills have been retired to pastures, trees or remain idle. Sheet and gully erosion continues at a rapid rate on unprotected fields. There is very little floodwater or sediment damage in the hill bottomlands. Shifting channels, fluctuating water levels and high velocity tend to weaken the stability of unprotected streambanks resulting in considerable loss of fertile bottomland through streambank erosion. Once the soil material enters the deep wide channels, which is an effective transport system for sediment, a large portion will be carried to the Delta.

Sedimentation specialists with the A.R.S. have estimated that the loss of land through streambank erosion is approximately 0.92 acre per channel mile per year between Valley Hill and McCarley. There is additional loss in each tributary through channel degrading. This loss in the tributaries is estimated to be approximately 50% of that on the main stem.

Land treatment, land stabilization, floodwater retarding structures and protective measures on streambanks will reduce the overall sediment delivered to the Delta by approximately 77 percent.

B. Delta Portion

Sediment:

Field studies were made to determine the extent of sand deposition, annual rate and average loss in production. See table on Page 3 for extent and annual rate of sedimentation.

Loss in production on damaged areas varied with depth of sedimentation. The weighted loss in production for the 1,070 acres is approximately 75 percent.

Range surveys at controlled points by the Corps of Engineers in 1947 show MSL elevations across the floodplain. These elevations reveal that a natural levee is building up adjacent to the floodway and lands in the perimeter of the damageable area are lower in elevation than the bottom of the channel.

This build-up in the channel bed is due to a decrease in stream gradient with resultant deposition of sand within the channel.

At out of bank stage the sand levees weaken quickly and soon give way to the active forces of floodwaters. Records of levee breaks provided by the Corps of Engineers since January, 1946 indicate there have been over twenty floods with numerous breaks in the levee for each flood. With each flood there is an increase in sand deposited near the levee. Sand deposition is increasing at approximately 65 acres per year.

Floodwater Damages:

Related damages to floodwater in the Delta cannot be determined on a stage area basis as outlined in the Hydraulic guide.

Estimates of benefits were based on the reduction in floods as a result of planned measures in the upland portion of the watershed, taking into consideration that the present channel and levee system in the Delta will remain unchanged.

Investigations and Analysis

A. Upland Portion of Watershed

A soil conservation district and flood prevention program were in operation prior to the MR&T study. To properly evaluate the effects of these programs an analysis was made to determine the extent and effectiveness of applied land treatment and land stabilization measures in the watershed. Any reduction in peak discharge and sedimentation to the delta floodplain would be creditable to a planned program above existing conditions.

Program determinations were made using standard methods and procedures outlined in Service guides and manuals. Where necessary and available technical assistance and material was secured from other agencies.

Technical material and Data Available:

A detailed soil survey of the watershed was made in 1945. From this survey a physical inventory was prepared showing the acres of different soil types, slope and erosion classes and land use. Land use and gully erosion was modified to show the changes during the period 1945-1956. A land capability classification, based upon the detailed soil survey, showing the treatment and/or measures necessary for soil protection and improvement was prepared for the watershed.

The U. S. Forest Service had completed a study and prepared a report showing present woodland conditions and treatment and measures needed for improved flood prevention. Included in the report was a table showing existing and future hydrologic condition classes expressed as percent for the forest lands in the watershed.

The Agriculture Research Service had determined the loss of land to streambank erosion between Valley Hill and McCarley and had estimated the gross erosion on small areas within the watershed. This information was valuable in computing the gross erosion and delivery rates for the entire watershed.

Photomosaics and other base maps were used to plan and record information necessary for program determinations.

Land Treatment and Land Stabilization Measures:

A detailed study of the watershed was made to determine the extent of land treatment and land stabilization measures necessary which would contribute materially to the overall flood prevention program. Recommended treatment and measures were based upon the physical conditions of the land as reflected in the land capability classification. The following table will show the present and proposed land use in the watershed for all land capability classes.

Cropland		Idle Land		Pasture and Perennials		Woodland		Misc.	Total
Present	Proposed	Present	Proposed	Present	Proposed	Present	Proposed		
13,610	13,076	6,464	0	8,232	10,963	45,998	50,265	1,203	75,507

The proposed 13,076 acres in cropland consists of 9,661 acres in bottomlands, and 3,415 acres on gentle and moderate slopes with moderate erosion. It is planned that all lands not suitable for row crop production be planted to grasses and legumes or trees for soil improvement, better land use and watershed protection.

Sedimentation Analysis:

Investigations in this analysis are outlined in the procedures manual for developing watershed work plans and included such items as source of sediment, gross erosion, soil cover complex, precent and lengths of slope, delivery rates, and hydrologic data adjusted for this particular watershed.

Principal sources of sand were from active gullies and county dirt and gravel roads throughout the watershed, while most of the fines or silt came from sheet and streambank erosion.

Sample surveys in the five major tributaries were made to determine the percent of active gullies producting an equivalent of 2 inches of sand per acre a year. This was expanded for the watershed using data from the physical land inventory. A reconnaissance of the county roads was made to determine the equivalent of 2 inches of sand lost per mile of road per year.

Loss of fines by sheet erosion was determined by Musgrave's soil decline formula as follows:

$$E = FCS^{1.35} L^{0.35} P^{1.75}$$

Where E = erosion in inches per year; F = soil characteristic; C = cover condition, expressed as percent of bare soil; S = degree of slope, in percent; L = length of slope, in feet; P = maximum 30 minute rainfall, 2 year frequency in inches.

Streambank erosion was determined by comparing channel differences for the period 1941-1956. This loss was found to be equivalent to 0.92 acre per channel mile per year.

Estimates of gross erosion were calculated for the entire watershed. To arrive at the amount delivered it was determined that 20% of the gross sheet erosion, 60% of the sands, and 100% of the streambank loss would be delivered to the delta floodplain. A summary analysis of erosion for the watershed is:

	Estimated Gross Erosion			Estimated Delivered to Delta		
** Present	Ac.Ft/Yr.	Tons/Ac/Yr	Tons/Yr*	Ac.Ft/Yr.	Tons/Ac/Yr	Tons Yr*
Sheet	648.5	29.5	1,167,300	129.7	5.9	233,460
Gully & Roads	331.8	15.1	597,240	199.1	9.1	358,380
Streambank	392.3	17.8	706,140	392.3	17.8	706,140
Total	1372.6	62.4	3,170,680	721.1	32.8	1,297,290
** Anticipated:	Below Floodwater Retarding Structures			Below Floodwater Retarding Structures		
Sheet	149.95	6.8	269,910	29.9	1.4	53,820
Gully & Roads	40.10	1.8	72,180	24.1	1.1	43,380
Streambank	117.10	5.3	210,780	117.1	5.3	210,780
Total	307.15	13.9	552,870	171.1	7.8	307,980

* One acre foot x 1800 = Tons per year.
** Does not include any material from streambed.

Sand within the channel bed was not considered as a source of sediment in this analysis. It is believed that channel beds are in equilibrium. Whatever bed material is delivered to the stream system is carried through the system and delivered to the delta and the channel bed remains at a relatively constant gradient and cross section.

With the installation of vegetative measures and floodwater retarding structures, the source of bed material from upland areas is materially reduced and may well be reduced below the amount that the stream has the capacity to transport.

Even with a regulated flow resulting from floodwater retarding structures it is probable that the transport capacity will not be reduced in the same amount as the upland source of bed material. The difference in amount of material delivered to the system and the amount the stream will be capable of transporting will necessarily have to come from the streambed itself. This will result in channel degradation which would probably start in the upstream portion of the stream system.

Even though we may reduce the production of bed materials

from upland sources, the delivery of bed material to the delta will not be reduced in the same amount. This would be due entirely to the change in source of material delivered.

If an assumption was made that the flow will remain on the present bed, and realistic present and anticipated flow duration curves could be developed it would be possible to estimate the amount of material that would be scoured from the bed.

Engineering - Hydraulic and Hydrologic Investigations:

Basic meteorologic and hydrologic data were tabulated and analyzed.

Engineering surveys were made to collect information on stream reaches, valley cross sections, channel capacities and other hydraulic characteristics, and on structure locations for other data used in design.

Determination was made of the hydrologic conditions of the watershed, taking into consideration soils, land use, topography, cover and climate.

Determination was made of rainfall-runoff relationships, frequency of occurrence of meteorologic events and relationship of runoff to flood volume likely to cause failures in the leveed section in the Delta area. The natural storm series of the 16-year period 1940 to 1955 at Greenwood, Mississippi was used in making these studies.

Determination was made of peak discharges under present watershed conditions, and under conditions which will exist due to (a) effect of land treatment and stabilization measures, and (b) effect of land treatment and stabilization measures and floodwater retarding structures.

The largest rain which occured during the 16-year period investigated was a storm of 5.71 inches on April 10-11, 1947. Under present conditions, this rain would produce 4.70 inches of runoff; after land treatment practices and measures have been applied, the runoff would be reduced to 4.20 inches.

In Big Sand Creek, 4.70 inches of runoff would produce a peak discharge of 33,000 cfs, 4.20 inches a discharge of 29,500 cfs; with land treatment and land stabilization applied and the structural measures for flood prevention in operation, the discharge would be further reduced to 14,600 cfs.

The runoff from the 100-year frequency storm was used to establish the minimum detention storage requirements. The average runoff from this storm for the several structural locations is estimated to be about 5.00 inches.

From a study of the relationship between runoff and flood events in Big Sand Creek under present conditions, it was found that 1.00-inch of runoff, due to changes in runoff producing characteristics at different seasons of the year, on the average would produce a discharge or flow of 5800 cfs at the Valley Hill gage.

Flood routings were made of the several major storms in the 16-year series in order to compare the estimated runoff characteristics of the watersheds with the stream gage records. Additional routings were made to determine the percentage of reduction in peak discharge which could be expected because of the establishment of land treatment and land stabilization measures, and floodwater retarding structures. These percentage reductions were related to damages so that benefits could be correctly allocated to each specific measure or treatment.

Proposed floodwater retarding structures in Big Sand Creek watershed would control approximately 51 percent of the drainage area.

An estimate was made of the minimum channel capacity within the leveed section of the Delta area for Big Sand Creek to relate runoff and peak discharge to levee breaks. The minimum channel capacity was estimated at 5,000 cfs, and most of the levee breaks seemed to have occurred at or above this flow, which in turn is approximately the discharge to be expected from 1.00-inch of runoff.

Bibliography

Source of Material, Information and Data

Rating Curve	U. S. Army Corps of Engineers
Hydrology	U. S. Department of Commerce Weather Bureau
	Report of Woodland Conditions U. S. Forest Service
	Hydrology Guide, USDA, SCS
Location, date and number of levee failures	U. S. Army Corps of Engineers
Sediment Production in Small Watersheds	Russell Woodburn, ARS
Sediment Problem Studied in Yazoo Watershed	Russell Woodburn, ARS
	Miss. Farm Research, 5/56
Watershed Planning Guides	Soil Conservation Service

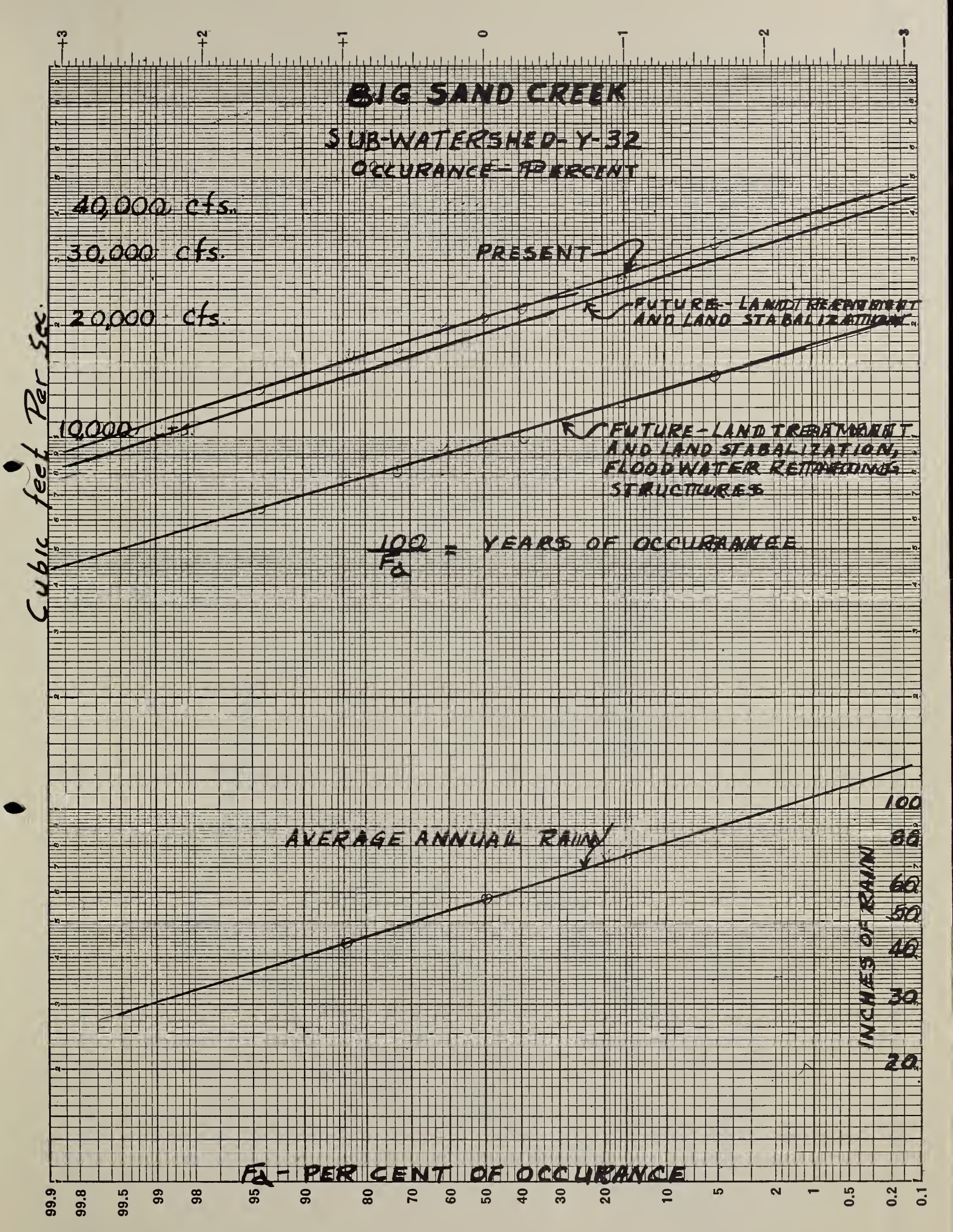
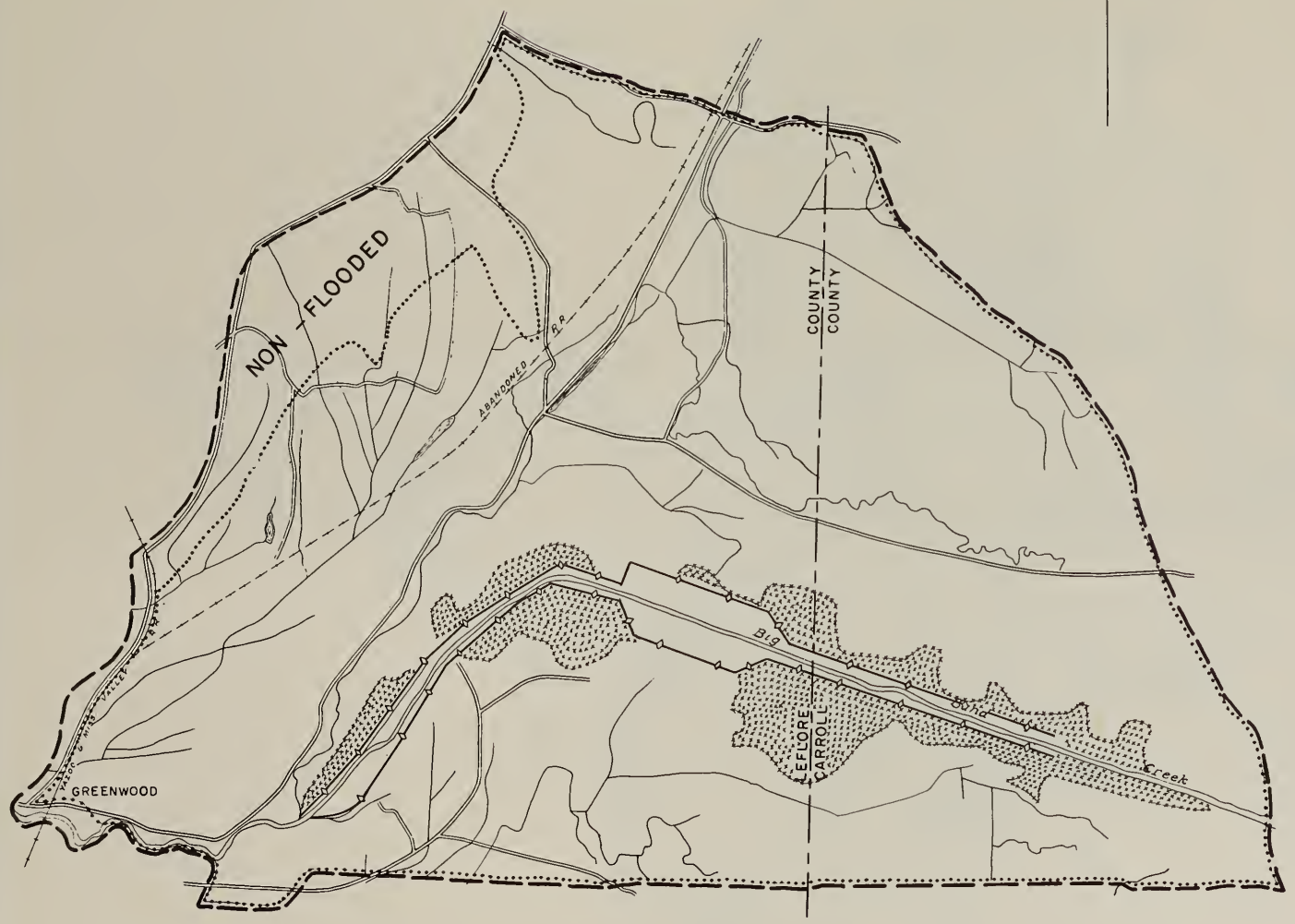

BIG SAND CREEK
SUB-WATERSHED-Y-32
OCCURANCE—PERCENT
40,000 cfs.
30,000 cfs.
20,000 cfs.
10,000 cfs.
PRESENT
FUTURE-LAND TREATMENT AND LAND STABALIZATION
FUTURE-LAND TREATMENT AND LAND STABALIZATION, FLOODWATER RETARDING STRUCTURES
100/Fd = YEARS OF OCCURANCE
AVERAGE ANNUAL RAIN
Cubic feet Per Sec.
INCHES OF RAIN
100
80
60
50
40
30
20
Fd - PER CENT OF OCCURANCE
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

Fig 1





LOCATION MAP

LEGEND

- IMPROVED ROADS
- UNIMPROVED ROADS
- DRAINAGE
- WATERSHED BOUNDARY
- FLOOD PLAIN BOUNDARY
- SEDIMENT DAMAGE
- EXISTING LEVEE

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROBLEM LOCATION MAP
BIG SAND CREEK WATERSHED

PORTIONS OF

CARROLL AND LEFLORE COUNTIES, MISSISSIPPI

½ 0 ½ 1 MILE

FEBRUARY 1957

APPROX. 14,480 ACRES

5-1-57

2-0-9124-2


LOCATION MAP
MISSISSIPPI
LEGEND
PAVED ROADS
IMPROVED ROADS
UNIMPROVED ROADS
FEDERAL HIGHWAY NUMBERS
DRAINAGE
WATERSHED BOUNDARY
FLOODWATER RETARDING STRUCTURE
DRAINAGE AREA — SPECIAL STRUCTURES
DA-206 ACRES DRAINAGE AREA
SSPA STABILIZATION OF RUNOFF AND SEDIMENT PRODUCING AREA
POST RETARDS
DA-736Ac
DA-1165Ac
DA-1088Ac
DA-512Ac
DA-998Ac
DA-4723Ac
DA 2106Ac
DA-6118Ac
DA-8698Ac
DA 2150Ac
DA-1210Ac
DA-3706Ac
DA 1171Ac
DA 4480Ac
CARROLLTON
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STRUCTURE LOCATION MAP
BIG SAND CREEK SUB-WATERSHED (Y-32)
A PORTION OF
YAZOO RIVER WATERSHED
WITHIN
CARROLL AND MONTGOMERY COUNTIES
MISSISSIPPI
APRIL, 1955
2-R-9159

REPORT ON
PRESENT AND ANTICIPATED
FLOODWATER AND SEDIMENTATION CONDITIONS
YAZOO HEADWATER PROJECT
PART II
PELUCIA CREEK, SUB PROJECT
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

PREPARED BY
U.S. DEPARTMENT OF AGRICULTURE
for the
MISSISSIPPI RIVER COMMISSION

SOIL CONSERVATION SERVICE
JACKSON, MISSISSIPPI
OCTOBER, 1957

Purpose and Scope of Study

For many years floodwaters and sediment from tributaries of the Yazoo River Watershed have caused severe hardships, damage, direct loss of life and livestock and improper utilization of the natural resources in the Yazoo-Mississippi Delta.

The purpose of this study is to estimate the extent of such damages on lands and property in the Yazoo-Mississippi alluvial floodplain of Leflore and Carroll counties affected by floodwaters and sediment from Pelucia Creek, a tributary of the Yazoo River, and the effects of a concentrated flood prevention-soil and water conservation program in the upland portion of this watershed on reductions in peak discharges and sediment into the alluvial floodplain.

While a detailed flood prevention-soil and water conservation plan is being prepared for the upland portion of the watershed to determine reductions in peak discharge, sediment and costs of measures, this plan will not constitute a part of this report. When the plan is completed a copy will be provided as supplemental background material.

Summary

Description of Watershed

Pelucia Creek lies in Leflore and Carroll Counties, Mississippi. The upland portion comprises 39,514 acres and the alluvial portion 33,060 acres. Within the alluvial portion 9,820 acres is subject to flooding and deposition and 2,790 acres is confined to the floodway.

The creek flows in a westerly direction from its origin south and east of Carrollton, Mississippi. From its entry into the alluvial floodplain, the creek is confined within the limits of the floodway to a point two miles east of its confluence with the Yazoo River.

The soils in the upland portion are associated with the loess resource area and occur on very steep slopes. Severe sheet and gully erosion occur in the eastern portion of the watershed. Most of the cropland occurs in the broad valleys; pasture, idle and woodland occur mostly in the hills.

The soils in the alluvial portion range from poorly drained, heavy clays to excessively drained sands. An alluvial cone has built up over a period of years adjacent to the Bluffs and extends westward for 2-3 miles. Because of frequent levee breaks along the floodway, land and water resources have not been utilized to their fullest extent. Farm and group drainage systems have not been developed to their best use due to frequent floodwater and sediment hazards.

Field Investigations

Hydrology

A rating curve was developed to show the peak discharge of

the maximum storm in the study series. This storm was on April 10, 1947. Estimated runoff of 4.70 inches would produce a peak flow of 12,300 cfs.

With proposed land treatment, land stabilization measures and floodwater retarding structures within the watershed, the estimated reduction in peak flow would be approximately 52 percent or 6,400 cfs.

It is estimated there will be a 54 percent reduction in the number of floods in the alluvial floodplain with proposed land treatment, land stabilization measures and floodwater retarding structures in the watershed. Land treatment and land stabilization measures would account for approximately 8 percent of this reduction.

Sedimentation

The following table will show the source of sediment and estimated annual delivery rate at the Bluff-Delta contact under existing and anticipated conditions.

Source	Existing Conditions			Future Conditions		
	Estimated Rate			Estimated Rate (Below Struct.)		
	Ac.Ft/Yr	Tons/Ac/Yr	Tons/Yr	Ac.Ft/Yr	Tons/Ac/Yr	Tons/Yr
Gullies & Roads	179.10	8.1	322,380	33.60	1.5	60,480
Sheet	52.00	2.4	93,600	13.00	0.6	23,400
Streambank	195.50	8.9	351,900	48.90	2.2	88,020
Total	426.60	19.4	767,880	95.50	4.3	171,900

Tons/Ac/Yr = Ac.Ft/Yr x .0455; Tons/Yr = Ac.Ft/Yr. x 1800

It is estimated that the planned soil conservation practices and flood prevention measures in the watershed would reduce sediment to the alluvial floodplain by approximately 78 percent. This is equivalent to 331.1 Ac.Ft/Yr. or 15.1 Tons/Ac/Yr. By measures this would be:

Land treatment	24.3	Ac.Ft/Yr	1.1.	Tons/Ac/Yr.
Land stabilization	107.6	"	4.9	"
Floodwater retarding structures	52.6	"	2.4	"
Streambank protection	146.6	"	6.7	"
Total reduction	331.1	"	15.1	"

The extent and degree of sediment damage in the alluvial floodplain was determined by a detailed field study. Conditions noted during this study were depth of deposition, areal coverage and land use. From this data and interviews with landowners the weighted loss of production on these areas was determined to be 65 percent.

By comparing extent of damage from 1941 aerial photographs

with the field study in December 1956 the annual rate of damage was found to be 81 acres per year.

1941	1956	Annual Rate
Total Acres Damaged	Total Acres Damaged	
149	1,368	81 Acres

Ecomomic

Damages:

Schedules were obtained in the upland portion of the watershed and alluvial floodplain to determine an average annual damage in these area. Floodwater damages in the upland portion were found to be very minor and are not included in the total damages.

The following table gives source, general location, and estimated amount of damage.

From	Estimated Average Annual Damages (Long-term Projected Prices)		
	Upland	Alluvial Floodplain	Total
Floodwater	-	190,176	190,176
Sediment	-	59,946	59,946
Land Destruction	19,982	-	19,982
Total	19,982	250,122	270,104

Planned Measures and Estimated Costs:

A land treatment, land stabilization and water control program was planned to meet the objectives as requested by the Corps of Engineers.

Land treatment for watershed protection will consist primarily of conservation crop rotation, terracing, pasture and tree planting; land treatment for flood prevention and reduction of sediment will consist primarily of revegation of critical areas in trees, grass and legumes, roadside erosion control, streambank stabilization, overfall structures and desilting basins; waterflow control measures will consist of 14 floodwater retarding structures and 6 miles of diversion ditches and dykes.

Total cost of these measures (1955 prices) is estimated

be $1,226,418 Federal and $389,000 Non-Federal. Annual
to be $1,226,418 Federal and $389,000 Non-Federal. Annual costs (1955 prices) for flood prevention measures would be:

Measures	Amortization of Installation			Operation and Maintenance			Total Annual Cost
	Federal	Non-Federal	Total	Federal	Non-Federal	Total	
Land Stabilization	2,225	3,323	5,548	1,024	2,622	3,646	9,194
Waterflow Control	29,362	2,036	31,398		2,806	2,806	34,204
Stream Channel Stabilization	9,667	1,484	11,151		1,600	1,600	12,751
Total	41,254	6,843	48,097	1,024	7,028	8,052	56,149

Benefits (Long-term projected prices) from structural measures will be:

Item (1)	Estimated Average Annual Damage Without Project (2)	Estimated Average Annual Damage Without Structural Measures (3)	Estimated Average Annual Damage With Project (4)	Benefits From Structural Measures (5)
Floodwater	190,176	186,418	95,271	91,147
Sediment	59,946	59,946	25,147	34,799
Land Destruction	19,982	19,982		19,982
Sub-Total	270,104	266,346	102,418	145,928
Benefits from more intensive use of floodplain				13,143
Total Flood Prevention Benefits				159,071

Description of Watershed

A. Upland Portion - 39,514 Acres

Physical:

Pelucia Creek lies in Leflore and Carroll Counties and flows in a westerly direction. It is approximately 14 miles long and 9 miles wide in the upper reaches of the watershed. Mississippi Highway 17 crosses the watershed in a north-south direction at a point south of Carrollton. West of this highway the watershed will average three miles in width. East of the highway the tributaries fan out in typical watershed pattern.

Soils and Topography:

The watershed lies entirely within the Loess Resource Area. From Mississippi Highway 17 westward the loess soil is very deep and highly

dissected with moderate sheet and gully erosion. There are several active gravel pits that contribute materially to the total sand delivered to the alluvial floodplain.

East of the Mississippi Highway 17 the loess soil decreases in depth, dissection of the landscape lessens, but sheet and gully erosion is very severe. Large areas of land have been completely abandoned to advanced stages of erosion; numerous large gullies have penetrated through the loess soil into the sands of the underlying Coastal Plain formation. The susceptibility of these soils to erosion has been a great factor in the tremendous amount of sediment deposited in the Delta. The valley bottoms are broad with deep wide channels. Channel degrading is prominent and the loss of land due to streambank cutting is serious west of Mississippi Highway 17. This loss contributes materially to the total amount of sediment delivered to the alluvial floodplain.

Land Use:

At the present time 30,177 acres or 76 percent of the land is in trees; 2,555 acres or 6 percent in pasture; 3,807 acres or 10 percent idle; 2,627 acres or 7 percent in cultivation; and 348 acres or 1 percent in miscellaneous uses. Of this 2,627 acres in cultivation, approximately 1,998 acres is in bottom land. Approximately 19 percent of the entire watershed or 7,532 acres is in bottom land.

Hydrologic Conditions:

The soils in woodland and pasture are in poor physical condition, due primarily to poor management. Infiltration is slow and runoff rapid. Valley slopes on the tributaries will average 25 feet per mile, while the main stem will average 10 feet per mile in the corridor and 15 feet per mile above Carrollton. The average annual precipitation is 52"; growing season 221 days; and mean temperature ranges from 82 degrees in July to 46 degrees in January.

B. Delta Portion - Approximately 12,600 Acres

The present channel of Pelucia Creek is confined to a leveed floodway to a point approximately 2 miles east of its confluence with the Yazoo River.

Prior to any measures to confine or control this flow of water it is evident that the stream "wandered at will" after entering the alluvial floodplain. Recent soil surveys in the area have revealed stratas of sand and silt at various depth and thickness; also the soils have been influenced by deposits of silt transported from this hill tributary several miles west of the Bluffs.

Since the levees, which confine the flow in the Delta, are built of very unstable material, any storm that will produce a peak discharge of approximately 2,200 cfs will result in breaks in the levees, sand deposited near these breaks, and farm land inundated.

The extent of damage resulting from levee failures will depend on the magnitude of the storm, number and location of levee breaks and season of year. As nearly as can be determined there is no continuity or pattern in levee failures from any magnitude of storm. Information provided by the Corps of Engineers on location and date of levee breaks indicate that over 50% of the breaks occur between the planting and harvesting season for row crops grown in the area.

Of the 12,600 acres in the study area approximately 2,790 acres is confined within the floodway. In the area subject to damage from floodwater and sediment outside the floodway, 6,810 acres are open and 2,832 acres in woodland.

Sixty percent of the 9,820 acres is poorly drained soils, 24 percent well drained, 14 percent in swamp and water and the remaining 2 percent damaged by sand. (Note - Due to different scale of maps in the soil survey and the one made for the detailed analysis, there is a difference in amount of detrimental sand.)

The cropping pattern is influenced to a large degree by acreage controls, and to a smaller degree damage to land by sand and flooding. There are approximately 2,410 acres of cotton, 1,112 acres corn, 1,854 acres pasture, 2,781 acres soybeans, 2,832 acres woods, and 1,112 acres idle or miscellaneous uses.

Watershed Problems

A. Upland Portion

The agricultural history of the area coupled with the physical characteristics of the watershed have contributed to the rapid deteriotation of its natural resources. Much of the fertile hill farm lands have now ceased to produce except at near subsistence levels or have been abandoned altogether. Cultivation of row crops is largely confined to the bottoms or narrow ridge tops. The severely eroded hills have been retired to pastures, trees or remain idle. Sheet and gully erosion continues at a rapid rate on unprotected fields. There is no significant floodwater or sediment damage in the hill bottomlands. Shifting channels, fluctuating water levels and high velocity tend to weaken the stability of unprotected streambanks resulting in considerable loss of fertile bottomland through streambank erosion. Once the soil material enters the deep wide channels, which is an effective transport system for sediment, a large portion will be carried to the Delta.

Estimates of loss of land through streambank erosion shows approximately 1.1 acre per channel mile per year between the valley and Mississippi Highway 17 and approximately 0.45 acre per channel mile per year above the highway.

Land treatment, land stabilization, floodwater retarding structures and protective measures along the streambanks will reduce the overall sediment to the Delta by approximately 78 percent.

B. Delta Portion

Sediment:

Field studies were made to determine the extent of sand deposition, annual rate and average loss in production. See table on Page 3 for extent and annual rate of sedimentation.

Loss in production on damaged areas varied with depth of sedimentation. The weighted loss in production for the 1,219 acres is approximately 65 percent.

At out of bank stage the sand levees weaken quickly and soon provided by the Corps of Engineers since January, 1946 indicate there have been over twenty-six floods with numerous breaks in the levee for each flood. With each flood there is an increase in sand deposited near the levee. Sand deposition is increasing a t approximately 81 acres per year.

Floodwater Damages:

Related damages to floodwater in the Delta cannot be determined on a stage area basis as outlined in the Hydraulic guide.

Estimates of benefits were based on the reduction in floods as a result of planned measures in the upland portion of the watershed, taking into consideration that the present channel and levee system in the Delta will remain unchanged.

Investigations and Analysis

A. Upland Portion of Watershed

A soil conservation district and flood prevention program were in operation prior to the MR&T study. To properly evaluate the effects of these programs an analysis was made to determine the extent and effectiveness of applied land treatment and land stabilization measures in the watershed. Any reduction in peak discharge and sedimentation to the delta floodplain would be creditable to a planned program above existing conditions.

Program determinations were made using standard methods and procedures outlined in Service guides and manuals. Where necessary and available technical assistance and material was secured from other agencies.

Technical Material and Data Available:

A detailed soil survey of 25 percent of the watershed was made in 1956. From this survey a physical inventory was prepared showing the acres of different soil types, slope and erosion classes and land use. Land use and gully erosion was modified to show the changes during the period 1945-1956. A land capability classification, based upon the detailed soil survey, showing the treatment and/or measures necessary for soil

protection and improvement was prepared for the watershed.

The U. S. Forest Service had completed a study and prepared a report showing present woodland conditions and treatment and measures needed for improved flood prevention. Included in the report was a table showing existing and future hydrologic condition classes expressed as percent for the forest lands in the watershed.

Photomosiacs and other base maps were used to plan and record information necessary for program determinations.

Land Treatment and Land Stabilization Measures:

A detailed study of the watershed was made to determine the extent of land treatment and land stabilization measures necessary which would contribute materially to the overall flood prevention program. Recommended treatment and measures were based upon the physical conditions of the land as reflected in the land capability classification. The following table will show the present and proposed land use in the watershed for all land capability classes.

Cropland		Idle Land		Pasture and Perennials		Woodland		Misc.	Total
Present	Proposed	Present	Proposed	Present	Proposed	Present	Proposed		
2,627	2,893	3,807	0	2,555	4,107	30,177	32,166	348	39,514

The proposed 2,893 acres in cropland consists of approximately 2,000 acres in bottomlands, and 893 acres on gentle and moderate slopes with moderate erosion. It is planned that all lands not suitable for row crop production be planted to grasses and legumes or trees for soil improvement, better land use and watershed protection.

Sedimentation Analysis:

Investigations in this analysis are outlined in the procedures manual for developing watershed work plans and included such items as source of sediment, gross erosion, soil cover complex, percent and lengths of slope, delivery rates, and hydrologic data adjusted for this particular watershed.

Principal sources of sand were from active gullies and county dirt and gravel roads throughout the watershed, while most of the fines or silt came from sheet and streambank erosion.

Sample surveys were made to determine the percent of active gullies producing an equivalent of 2 inches of sand per acre a year. This was expanded for the watershed using data from the physical land inventory. A reconnaissance of the county roads was made to determine the

equivalent of 2 inches of sand lost per mile of road per year.

Loss of fines by sheet erosion was determined by Musgrave's soil decline formula as follows:

$$E = FCS^{1.35} L^{0.35} p^{1.75}$$

Where E = erosion in inches per year; F = soil characteristic; C = cover condition, expressed as percent of bare soil; S = degree of slope, in percent; L = length of slope, in feet; P = maximum 30 minute rainfall, 2 year frequency in inches.

Streambank erosion was determined by comparing channel differences for the period 1941-1956. This loss was found to be equivalent to 1.1 acre per channel mile per year to Mississippi Highway 17 and 0.45 acre per channel mile per year above Mississippi Highway 17.

Estimates of gross erosion were calculated for the entire watershed. To arrive at the amount delivered it was determined that 20 percent of the gross sheet erosion, 60 percent of the sands, and 100 percent of the streambank loss would be delivered to the delta floodplain. A summary analysis of erosion for the watershed is:

	Estimated Gross Erosion			Estimated Delivered to Delta		
** Present	Ac.Ft/Yr.	Tons/ac/yr.	Tpms/Yr.*	Ac.Ft/Yr.	Tons/Ac/Yr	Tons/Yr.*
Sheet	260.2	11.8	468,360	52.0	2.4	93,600
Gully & Roads	298.5	13.6	537,300	179.1	8.1	322,380
Streambank	195.5	8.9	351,900	195.5	8.9	351,900
Total	754.2	34.3	1,357,560	426.6	19.4	767,880
**Anticipated:	Estimated Gross Erosion Below Floodwater Retarding Structures			Estimated Delivery to Delta Below Floodwater Retarding Structures		
Sheet	65.0	3.0	249,480	13.0	.59	23,400
Gully & Roads	56.0	2.5	214,740	33.6	1.53	60,480
Streambank	48.9	2.2	88,020	48.9	2.22	88,020
Total	169.9	7.7	552,240	95.5	4.34	171,900

* One acre foot x 1800 = tons per year.
** Does not include any material from streambed.

Sand within the channel bed was not considered as a source of sediment in this analysis. It is believed that channel beds are in equilibrium. Whatever bed material is delivered to the stream system is carried through the system and delivered to the delta and the channel bed remains at a relatively constant gradient and cross section.

With the installation of vegetative measures and floodwater retarding structures, the source of bed material from upland areas is materially reduced and may well be reduced below the amount that the stream has the capacity to transport.

Even with a regulated flow resulting from floodwater retarding structures it is probable that the transport capacity will not be reduced in the same amount as the upland source of bed material. The difference in amount of material delivered to the system and the amount the stream will be capable of transporting will necessarily have to come from the streambed itself. This will result in channel degradation which would probably start in the upstream portion of the stream system.

Even though we may reduce the production of bed materials from upland sources, the delivery of bed material to the delta will not be reduced in the same amount. This would be due entirely to the change in source of material delivered.

If an assumption was made that the flow will remain on the present bed, and realistic present and anticipated flow duration curves could be developed it would be possible to estimate the amount of material that would be scoured from the bed.

Engineering - Hydraulic and Hydrologic Investigations:

Basic meteorologic and hydrologic data were tabulated and analyzed.

Engineering surveys were made to collect information on stream reaches, valley cross sections, channel capacities and other hydraulic characteristics, and on structure locations for other data used in design.

Determination was made of the hydrologic conditions of the watershed, taking into consideration soils, land use, topography, cover and climate.

Determination was made of rainfall-runoff relationships, frequency of occurrence of meteorologic events and relationship of runoff to flood volume likely to cause failures in the leveed section in the Delta area. The natural storm series of the 16-year period 1940 to 1955 at Greenwood, Mississippi was used in making these studies.

Determination was made of peak discharges under present watershed conditions, and under conditions which will exist due to (a) effect of land treatment and stabilization measures, and (b) effect of land treatment and stabilization measures and floodwater retarding structures.

The largest rain which occured during the 16-year period investigated was a storm of 5.71 inches on April 10-11, 1947. Under present conditions, this rain would produce 4.70 inches of runoff; after land treatment practices and measures have been applied, the runoff would be reduced to 4.20 inches.

In Pelucia Creek 4.70 inches of runoff would produce a peak discharge of 12,300 cfs, 4.20 inches a discharge of 11,000 cfs; with land treatment and land stabilization applied and the structural measures for flood prevention in operation, the discharge would be further reduced to 6,800 cfs.

The runoff from the 100-year frequency storm was used to establish the minimum detention storage requirements. The average runoff from this storm for the several structural locations is estimated to be about 5.00 inches.

From a study of the relationship between runoff and flood events in Pelucia Creek under present conditions, it was found that 1.00-inch of runoff, due to changes in runoff producing characteristics at different seasons of the year, on the average would produce a discharge or flow of 2,200 cfs.

Flood routings were made of the several major storms in the 16-year series in order to compare the estimated runoff characteristics of the watersheds with the stream gage records. Additional routings were made to determine the percentage of reduction in peak discharge which could be expected because of the establishment of land treatment and land stabilization measures, and floodwater retarding structures. These percentage reductions were related to damages so that benefits could be correctly allocated to each specific measure or treatment.

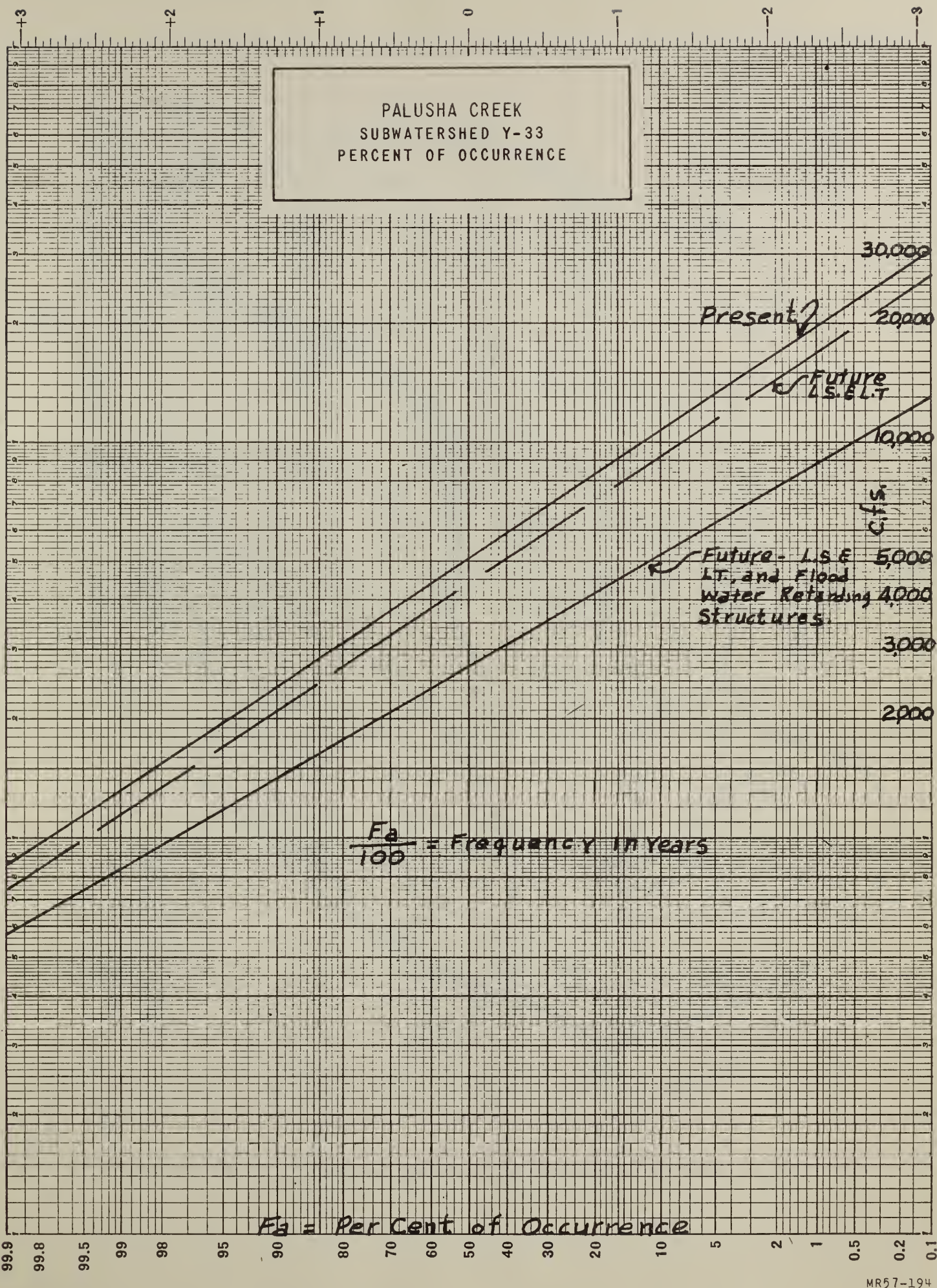
Proposed floodwater retarding structures in Pelucia Creek watershed would control approximately 53 percent of the drainage area.

An estimate was made of the minimum channel capacity within the leveed section of the Delta area for Pelucia Creek to relate runoff and peak discharge to levee breaks. The minimum channel capacity was estimated at 2,000 cfs, and most of the levee breaks seemed to have occurred at or above this flow, which in turn is approximately the discharge to be expected from 1.00-inch of runoff.

Bibliography

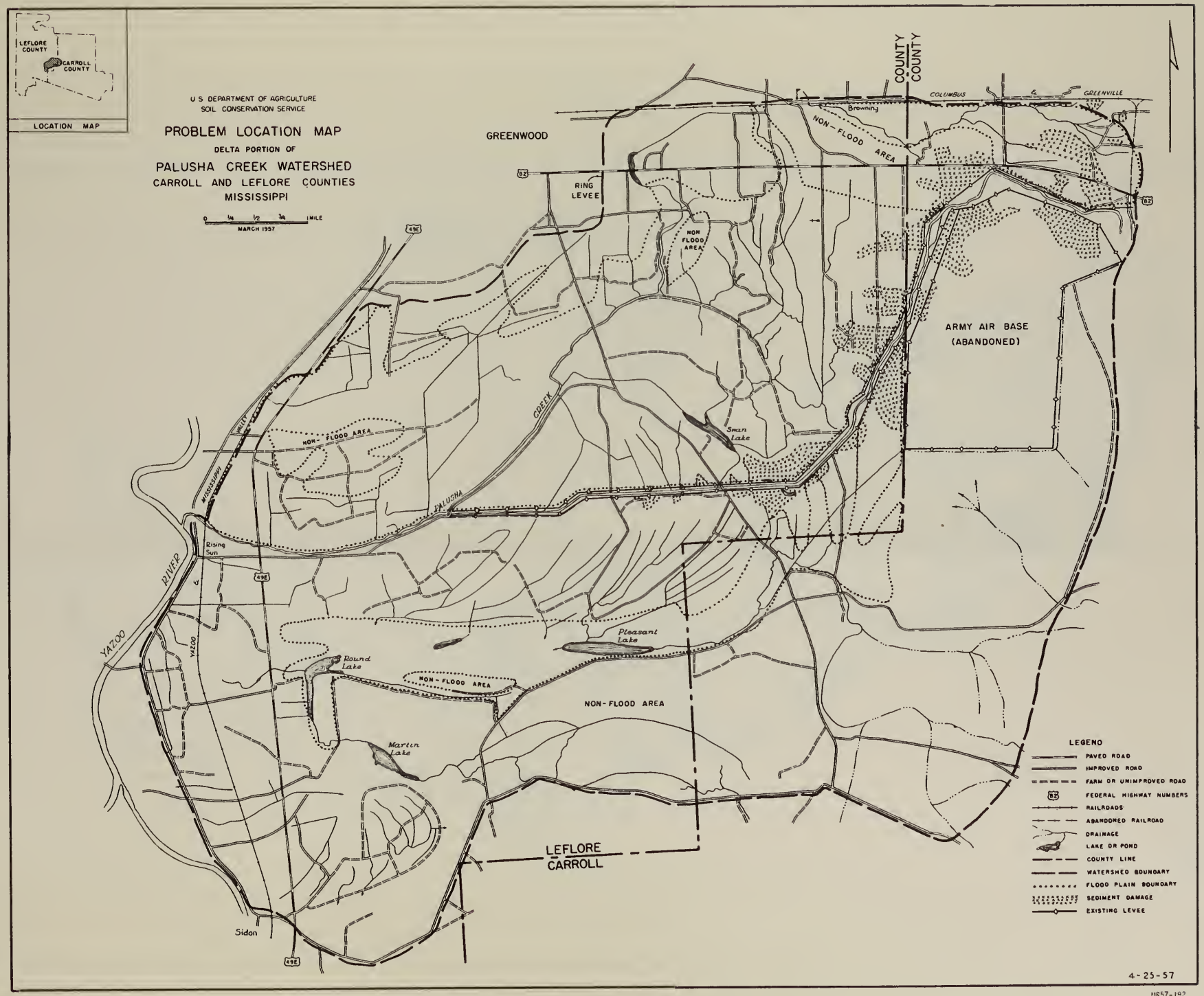
Source of Material, Information and Data

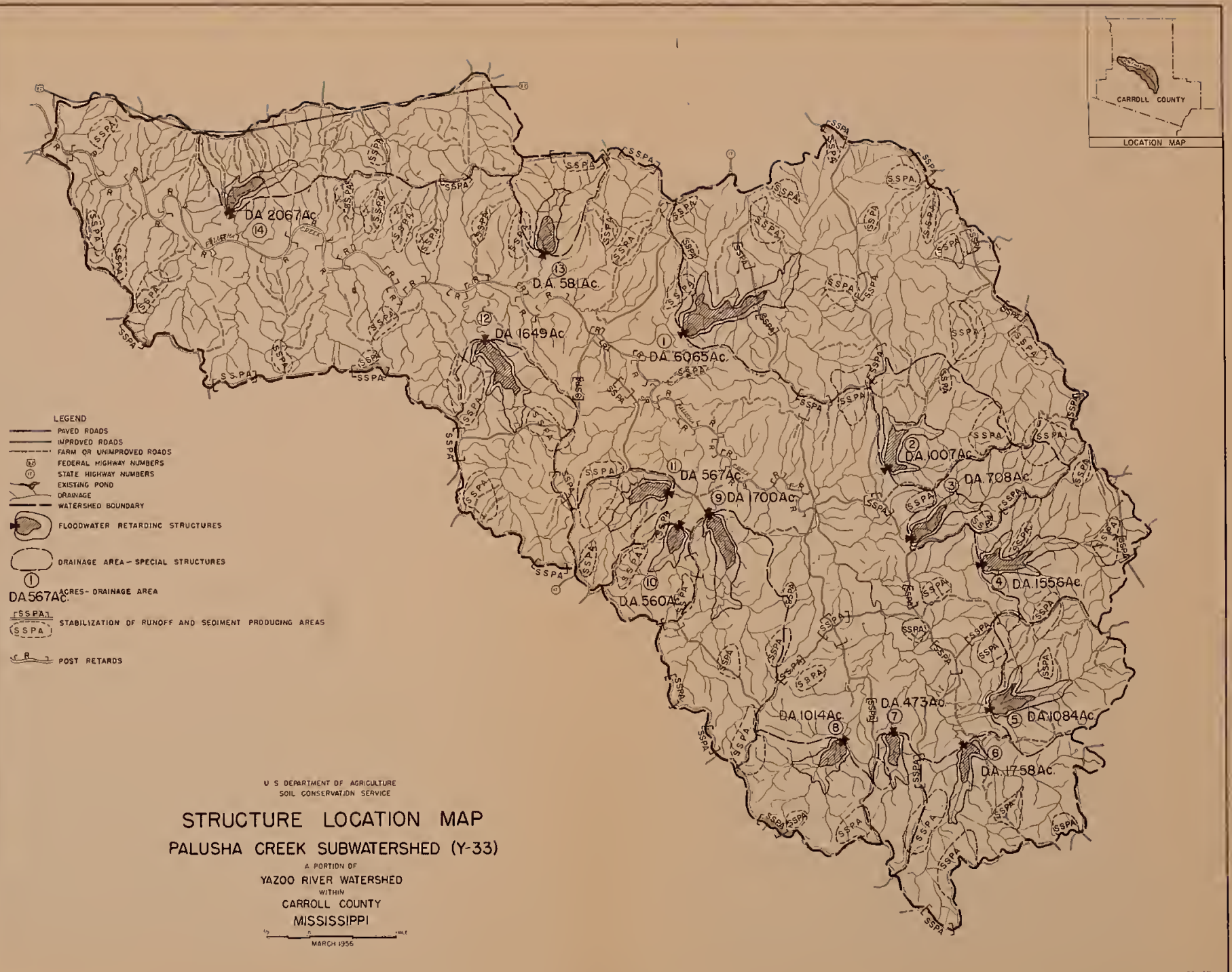
Hydrology	U. S. Department of Commerce Weather Bureau Report of Woodland Conditions U.S.Forest Service Hydrology Guide, USDA, SCS
Location, date and number of levee failures	U. S. Army Corps of Engineers
Sediment Production in Small Watersheds	Russell Woodburn, ARS
Sediment Problem Studued in Yazoo Watershed	Russell Woodburn, ARS Miss. Farm Research, 5/56
Watershed Planning Guides	Soil Conservation Service



USDA SCS SPARTANBURG S C 1957

MR57-194


LEFLORE COUNTY
CARROLL COUNTY
LOCATION MAP
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PROBLEM LOCATION MAP
DELTA PORTION OF
PALUSHA CREEK WATERSHED
CARROLL AND LEFLORE COUNTIES
MISSISSIPPI
0 1/4 1/2 3/4 MILE
MARCH 1957
GREENWOOD
COUNTY
COUNTY
COLUMBUS
GREENVILLE
Browning
NON-FLOOD AREA
RING LEVEE
NON FLOOD AREA
ARMY AIR BASE
(ABANDONED)
Swan Lake
PALUSHA CREEK
MISSISSIPPI
NON-FLOOD AREA
Rising Sun
YAZOO RIVER
YAZOO
Pleasant Lake
Round Lake
NON-FLOOD AREA
NON-FLOOD AREA
Martin Lake
LEFLORE
CARROLL
Sidon
LEGEND
PAVED ROAD
IMPROVED ROAD
FARM OR UNIMPROVED ROAD
FEDERAL HIGHWAY NUMBERS
RAILROADS
ABANDONED RAILROAD
DRAINAGE
LAKE OR POND
COUNTY LINE
WATERSHED BOUNDARY
FLOOD PLAIN BOUNDARY
SEDIMENT DAMAGE
EXISTING LEVEE
4-25-57



U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STRUCTURE LOCATION MAP

PALUSHA CREEK SUBWATERSHED (Y-33)

A PORTION OF
YAZOO RIVER WATERSHED
WITHIN
CARROLL COUNTY
MISSISSIPPI

MARCH 1956

4-30-57

REPORT ON
PRESENT AND ANTICIPATED AGRICULTURAL CONDITIONS

YAZOO HEADWATER PROJECT
PART III

YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

REPORT ON
PRESENT AND ANTICIPATED
FLOODWATER AND SEDIMENTATION CONDITIONS
YAZOO HEADWATER PROJECT
PART III
BLUFF TRIBUTARIES STUDY AREA
YAZOO RIVER BASIN, MISSISSIPPI
MISSISSIPPI RIVER & TRIBUTARIES PROJECT REVIEW

PREPARED BY
U. S. DEPARTMENT OF AGRICULTURE
for the
MISSISSIPPI RIVER COMMISSION

SOIL CONSERVATION SERVICE
JACKSON, MISSISSIPPI
OCTOBER, 1957

Purpose and Scope of Study

The purpose of this study is to estimate the present and anticipated peak discharge and sediment that enters the Mississippi alluvial floodplain from selected tributaries in the Yazoo River watershed. The study will also include estimate of costs for a feasible watershed protection and flood prevention program that will effect anticipated reductions in sedimentation and peak discharges.

The study is of a detailed-reconnaissance nature. All available information was secured from local people that would contribute to the effectiveness of the study. The similarity of completed data compares favorably with the detailed studies made on other watersheds in the same general area. For comparative purposes there are included the results of detailed studies on Big Sand, Pelucia and Askalmore Creeks.

No estimates were made on extent of damages to lands or property in the upland tributaries or alluvial floodplain.

The request for this special study was made in a meeting with the Vicksburg District, Corps of Engineers on March 27, 1957.

The study includes the following watersheds: In Carroll County, Potacocowa-Teoc Creeks and Abiacha Creek; in Holmes County, Chicopa, Fannegusha and Black Creeks.

Description of Area

A. Problems in Common

Each of the watersheds studied lie in the Loess Resource Area and each has problems common to all. In the western portion of the watersheds, the slopes are very steep with a high percentage of the land in woods and pasture; the soils are of very deep loess with only moderate sheet and gully erosion. Toward the central and eastern portion of the watersheds the topography lessens somewhat but erosion becomes more severe. There are usually numerous active gullies that have penetrated the loess soil into the unconsolidated sands of Coastal Plain origin. Land use changes into more pasture and general crops on the hills. The broad valleys contain a majority of the row crops grown and are usually free of flood damage due to deep wide channels.

B. Problem Areas - By Watersheds

Areas within a Land Resource Area with similar physical characteristics are identified as a "problem area" by the Soil Conservation Service. Where there is a significant difference in slope, soil types or erosion conditions that would reflect a change in the recommended land use there would necessarily be a change in the problem area classification. Within the eight watersheds studied on the detail and reconnaissance basis, there eight different problem area; however, no one watershed has more than five.

The characteristics of the problem areas in each watershed were evaluated in determining present and anticipated floodwater and sediment conditions.

The following is a definition of each problem area found in this study (See problem area map):

L-1 Deep very fertile, well drained loess soils on very steep slopes. This area is dominantly in forest and erosion is not too severe as a whole. Where the land has been cleared, sheet and gully erosion are very severe. These soils erode rapidly. Ridges are narrow. Valleys are narrow and V-shaped without too much alluvium. Trees do well on this area.

L-5 Deep, fertile, well drained loess soils on upper parts of slopes and on ridges, but loess becomes thin over friable sandy coastal plain material on the lower portions of slopes. Erosion is very severe. Much of the land is too steep for cultivation, has been cleared, cropped, and abandoned. Ridges range from narrow to medium width. Slopes range from strong to very steep. Valleys are medium width and contain much of the cropland of the area.

L-6 Rough, thin loess hills. Well drained, thin loess over friable sandy material on very steep slopes. Much of this land has been cleared and both sheet and gully erosion are severe. Ridges are usually narrow, but some widen and are of moderately deep soils on moderate slopes with moderate to severe erosion. Valleys are fairly narrow, and usually need drainage.

L-19 Better lying valley and adjacent hill land. Valleys are broad with imperfectly to well drained, silty alluvial soils of good quality. Local drainage is needed. Streambank caving is a serious problem. Adjacent to these valleys are varying amounts of terrace and hill lands of moderately deep, silty soils on gentle to strong slopes. Erosion is moderate to severe. The majority of the land in this unit area has been cleared and is or has been in crops.

L-24 Dominantly deep with some moderately deep soils made up of thin loess over sandy coastal plain material on strongly sloping to steep slopes. Occasional areas of moderately sloping land occur. Erosion is severe, both sheet and gully. Much abandonment of land occurs in this area and natural reseeding processes are covering appreciable qunatities of land with young pine. Cropping is generally restricted to the medium width, moderately productive valleys. Valley sanding is becoming a problem in local areas.

L-27 Mixed deep and moderately deep loess soils, dominantly on moderate slopes, though gentle and strong slopes do occur. Sheet erosion tends to be severe and some gullying has occurred. Bottoms are broad, made up of silty soils which generally are moderately well drained. Some drainage is needed locally. The land in this unit is dominantly open and much of it has been or is in crops.

L-30 Deep, well drained loess soils on ridge tops and upper portions of side slopes, becoming deep, well drained thin loess over sandy material on lower portion of side slopes. Ridge tops range from medium width to narrow, generally strongly sloping to steep, while side slopes are steep and very steep. Sheet erosion is very severe and gullies are numerous and spectacular. Abandonment of hill land is common. Valleys are medium width, silty and quite good quality, making up a large portion of the cropland of this area. Big Hungry Area.

L-32 Deep, well drained, quite productive loessial soils on moderately and strongly sloping broad ridge tops. Side slopes are steep and very steep. Sheet and gully erosion are very severe. Bottoms range from medium width to wide, made up of moderately well drained, productive silty alluvial soils. Drainage is needed locally. Nearly all of the land in this unit has been cleared and cropped. Subsequent erosion caused much abandonment. Grazing land is gradually developing.

Investigation and Analysis

A. Detailed Studies

At the time the Vicksburg District made their special request for additional information on selected hill tributaries, the Soil Conservation Service was completing detailed studies of a similar nature on Big Sand, Pelucia and Askalmore watersheds.

Separate reports have been prepared on Big Sand and Pelucia Creeks and will be a part of the overall Yazoo Headwater Report, Part II.

Information on Askalmore will be found in the tables of this report (Part III).

Additional information may be obtained on damages, benefits and costs from the Flood Prevention Work Plans prepared by the Soil Conservation Service on Big Sand, Pelucia and Askalmore Creeks.

Procedures used in obtaining information will be found in Part II of the overall report.

B. Reconnaissance Investigations

Previously scheduled completion dates did not permit studies of equal intensity or detail as on Big Sand, etc. It was agreed that studies of a reconnaissance scope could provide the necessary information to make relaible estimates in the present and anticipated floodwater and sedimentation conditions on those watersheds designated for study.

The procedures and methods used in this special study follow closely those made on the detailed studies.

Engineering surveys were made in representative areas to determine the size of floodwater retarding structures, acres inundated and storage capacity involved. Cost estimates were then made based upon the cubic yards of earth in each structure and rights-of-way behind each structure.

Hydrologic investigations and analyses were based upon present and anticipated conditions in each watershed and involved present and future land use, hydrologic conditions of woodland, and percent of land below structures. The reduction in peak discharge varies from 48 to 75 percent depending to a large extent on the total acreage of land behind structures.

Sedimentation studies followed the pattern outlined in Part II of Big Sand and Pelucia Creeks. There was considerable information available to make reliable estimates on present and anticipated conditions. The reduction in sediment will average 80 percent for all watersheds studied.

The land treatment and land stabilization program was completed with close cooperation with the flood prevention farm planner for each watershed in their respective counties. The vegetative work established to date was recognized and plans as outlined in the flood prevention program were used to make estimates and determine effects of the future vegetative program in each watershed.

Land treatment costs are not included in the total annual costs since this type of work is a part of normal farm operations. Land stabilization costs were determined on the current cost basis as used in the authorized Flood Prevention Program.

The location, extent or number of vegetative and engineering measures was made with the local Soil Conservation Service personnel most familiar with the areas studied. Previous work and knowledge gained in the authorized Flood Prevention area was of immense value in making these estimates.

The following tables outline by watersheds the size, present and future land use, number of floodwater retarding structures, acres inundated, storage capacity, source and rates of sediment for present and anticipated conditions, and present and anticipated peak flows. Estimates of costs were also made for land treatment and land stabilization, streambank stabilization, and floodwater retarding structures. These

cost estimates were then prorated to show the federal and non-federal cost-sharing portions, total cost and annual costs.

No economic investigations were made to determine the feasibility of programs planned for the six watersheds on which reconnaissance scope investigations were made. Comparison with similar watersheds studied in detail indicate favorable benefit cost ratios.

RELATIONSHIP CHARACTERISTICS - BLUFF TRIBUTARIES

DETAIL STUDY

ITEM	UNIT	BIG SAND	PELUCIA	ASKALMORE
Physical Data				
Total Drainage Area	Sq.Miles	118.0	61.7	32.6
Subwatershed	Acres	75,507	39,514	20,875
Present Land Use				
Cultivation	Acres	13,610	2,627	2,767
Idle	Acres	7,667	4,155	7,324
Pasture	Acres	8,232	2,555	1,801
Woodland	Acres	45,998	30,177	8,983
Future Land Use				
Cultivation	Acres	13,076	2,893	1,856
Idle	Acres	0	0	0
Pasture	Acres	10,963	4,107	3,500
Woodland	Acres	51,468	32,514	15,519
Floodwater Retarding Structures	No.	14	14	5
Drainage Area Above Structures	Acres	39,354	20,800	14,578
Drainage Area Above Structures	Percent	52	53	70
Area Inundated				
Floodplain: Sediment Pool	Acres	631	409	0
Flood Pool	Acres	721	442	0
Upland: Sediment Pool	Acres	217	122	174
Flood Pool	Acres	363	161	510
Total Inundated Area	Acres	1,932	1,134	684
Storage: Sediment Pool	Acre Ft.	5,773	3,545	1,001
Flood Pool	Acre Ft.	17,039	9,184	5,976
Total Storage	Acre Ft.	22,812	12,729	6,977
Sediment and Source				
Present Delivery Estimate	Acre Ft/Yr	721.1	426.60	132.80
Gully and Roads (Sands)	Acre Ft/Yr	199.1	179.10	62.00
Sheet (Silt)	Acre Ft/Yr	129.7	52.00	24.30
Streambank (Silt)	Acre Ft/Yr	392.3	195.50	46.50
Future Delivery	Acre Ft/Yr	171.1	95.50	6.25
Gully and Roads	Acre Ft/Yr	24.1	33.60	3.75
Sheet	Acre Ft/Yr	29.9	13.00	2.50
Streambank	Acre Ft/Yr	117.1	48.90	0
Reduction	Percent	77	77.8	95
Present Peak Flow*	cfs	33,000	25,000	6,420**
Future Peak Flow	cfs	14,600	12,000	1,600
Reduction	Percent	54.6	51.9	75.0

* Synthetic unit hydrograph - 1947 storm.
** November 1948 storm - SCS estimate.

RELATIONSHIP CHARACTERISTICS - BLUFF TRIBUTARIES

RECONNAISSANCE STUDY

ITEM	UNIT	POTACOCOWA	TEOC	ABIACA
Physical Data				
Total Drainage Area	Sq. Miles	68.1	36.4	96.7
Subwatershed	Acres	43,597	23,283	61,888
Present Land Use				
Cultivation	Acres	8,518	3,803	No information available
Idle	Acres	5,615	3,130	
Pasture	Acres	4,173	2,571	
Woodland	Acres	25,291	13,779	
Future Land Use				
Cultivation	Acres	6,718	2,951	
Idle	Acres	0	0	
Pasture	Acres	13,718	7,362	
Woodland	Acres	23,161	12,970	
Floodwater Retarding Structures	No.	15	8	11
Drainage Area Above Structures	Acres	26,496	16,089	33,018
Drainage Area Above Structures	Percent	61	69	53
Area Inundated				
Floodplain: Sediment Pool	Acres	353	214	437
Flood Pool	Acres	497	302	619
Upland: Sediment Pool	Acres	150	90	187
Flood Pool	Acres	331	201	412
Total Inundated Area	Acres	1,331	807	1,655
Storage: Sediment Pool	Acre Ft.	3,605	2,574	4,376
Flood Pool	Acre Ft.	11,527	7,007	14,365
Total Storage	Acre Ft.	15,132	9,581	18,741
Sediment and Source				
Present Delivery Estimate	Acre Ft/Yr	590.88	222.35	706.30
Gully and Roads (Sands)	Acre Ft/Yr	138.23	94.14	203.28
Sheet (Silt)	Acre Ft/Yr	69.35	40.91	101.02
Streambank (Silt)	Acre Ft/Yr	383.30	87.30	402.00
Future Delivery	Acre Ft/Yr	161.93	36.68	147.81
Gully and Roads	Acre Ft/Yr	34.49	6.87	31.61
Sheet	Acre Ft/Yr	31.61	7.98	15.70
Streambank	Acre Ft/Yr	95.83	21.83	100.50
Reduction	Percent	79.4	83.4	79
Present Peak Flow *	cfs	35,000	20,000	35,000
Future Peak Flow	cfs	11,000	6,000	16,000
Reduction	Percent	68.6	70.0	54.3

* Synthetic unit hydrograph - 1947 storm.

RELATIONSHIP CHARACTERISTICS - BLUFF TRIBUTARIES

RECONNAISSANCE STUDY

ITEM	UNIT	CHICOPA	FANNEGUSHA	BLACK
Physical Data				
Total Drainage Area	Sq. Miles	40.5	111.9	190.1
Subwatershed	Acres	25,928	71,608	121,635
Present Land Use				**
Cultivation	Acres	No information available	16,831	16,195
Idle	Acres		9,191	11,376
Pasture	Acres		8,625	8,422
Woodland	Acres		36,961	38,202
Future Land Use				
Cultivation	Acres		9,629	9,922
Idle	Acres		0	0
Pasture	Acres		26,724	23,013
Woodland	Acres		35,255	41,260
Floodwater Retarding Structures	No.	5	13	25
Drainage Area Above Structures	Acres	13,351	36,202	60,011
Drainage Area Above Structures	Percent	52	51	49
Area Inundated				
Floodplain: Sediment Pool	Acres	177	479	796
Flood Pool	Acres	250	679	1,125
Upland: Sediment Pool	Acres	76	206	340
Flood Pool	Acres	167	452	749
Total Inundated Area	Acres	670	1,816	3,010
Storage: Sediment Pool	Acre Ft.	1,554	4,210	7,027
Flood Pool	Acre Ft.	5,807	15,778	26,099
Total Storage	Acre Ft.	7,361	19,988	33,126
Sediment and Source				
Present Delivery Estimate	Acre Ft/Yr	167.75	439.18	646.03
Gully and Roads (Sands)	Acre Ft/Yr	66.27	182.37	316.52
Sheet (Silt)	Acre Ft/Yr	44.18	107.11	219.51
Streambank (Silt)	Acre Ft/Yr	57.30	149.70	110.00
Future Delivery	Acre Ft/Yr	34.17	93.67	120.64
Gully and Roads	Acre Ft/Yr	8.34	24.75	41.55
Sheet	Acre Ft/Yr	11.50	31.50	51.59
Streambank	Acre Ft/Yr	14.33	37.42	27.50
Reduction	Percent	79.6	78.7	81.4
Present Peak Flow *	cfs	13,000	34,000	25,000
Future Peak Flow	cfs	6,000	16,000	13,000
Reduction	Percent	53.8	53.0	48.0

* Synthetic unit hydrograph - 1947 storm.

** No information available on land use in remaining 47,400 acres which is Harland Creek, tributary of Black Creek.

COST DATA - BLUFF TRIBUTARIES

DETAIL STUDY
(Based on 1957 prices)

Measures (1)	Federal Cost (2)	Non-Federal Cost (3)	Total Cost (4)	Total Annual Cost (5)
BIG SAND CREEK				
Land Treatment	90,954	408,287	499,241	
Land Stabilization	191,834	125,077	316,911	19,411
Streambank Stabilization	217,140	55,226	272,366	11,131
Floodwater Retarding Str.	881,505	81,304	962,809	37,821
Total	1,381,433	669,894	2,051,327	68,363
PELUCIA CREEK				
Land Treatment	56,407	241,994	298,401	
Land Stabilization	63,102	71,391	134,493	9,194
Streambank Stabilization	274,166	31,868	306,034	12,751
Floodwater Retarding Str.	832,743	43,747	876,490	34,204
Total	1,226,418	389,000	1,615,418	56,149
ASKALMORE CREEK				
Land Treatment	24,805	127,297	152,102	
Land Stabilization	172,419	105,880	278,299	15,617
Streambank Stabilization	42,602	12,805	55,407	2,202
Floodwater Retarding Str.	289,376	35,750	325,126	13,737
Total	529,202	281,732	810,934	31,556

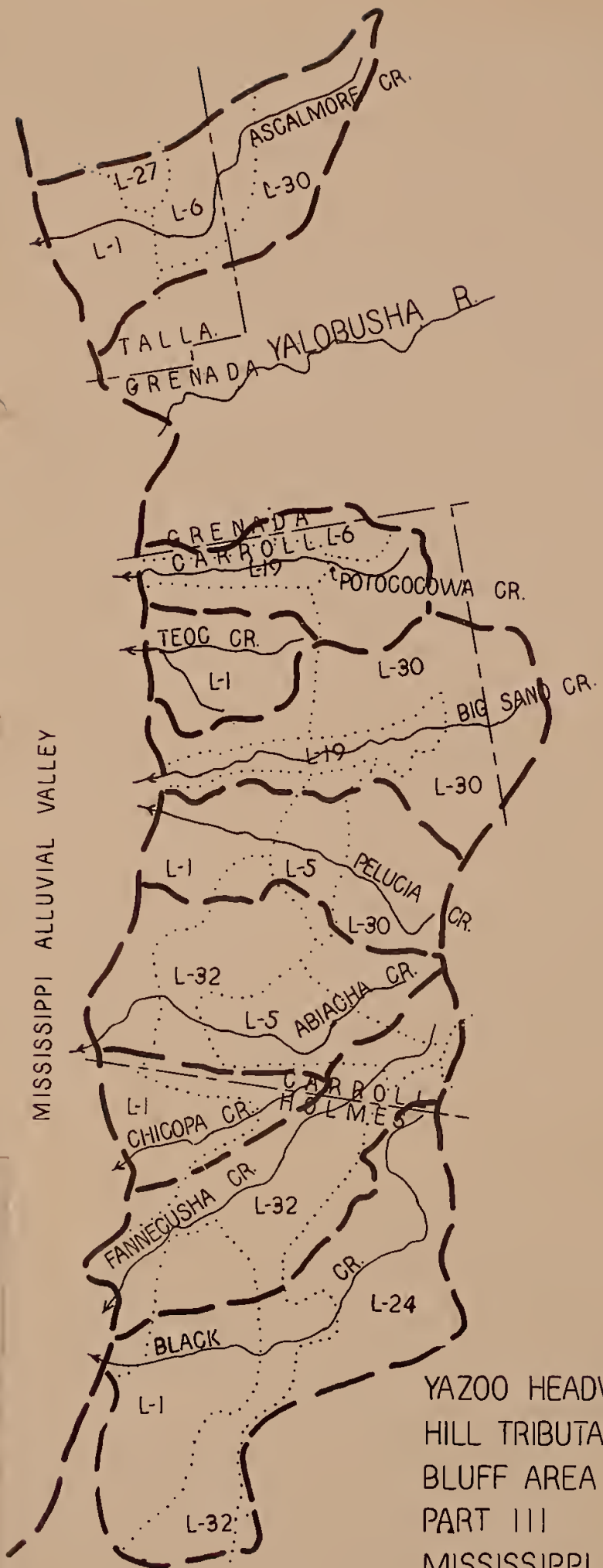
COST DATA - BLUFF TRIBUTARIES

RECONNAISSANCE STUDY

(Based on 1957 prices as outlined in memorandum from State Office, Revised)

Measure (1)	Federal Cost (2)	Non-Federal Cost (3)	Total Cost (4)	Total Annual Cost (5)
POTACOCOWA CREEK				
Land Treatment	46,799	350,288	397,087	
Land Stabilization	152,851	49,297	202,148	10,184
Streambank Stabilization	217,913	49,492	267,405	10,928
Floodwater Retarding Str.	821,316	55,649	876,965	34,316
Total	1,238,879	504,726	1,743,605	55,428
TEOC CREEK				
Land Treatment	24,142	206,695	230,837	
Land Stabilization	76,786	29,356	106,142	5,348
Streambank Stabilization	108,181	15,859	124,040	5,046
Floodwater Retarding Str.	508,779	33,740	542,519	21,224
Total	717,888	285,650	1,003,538	31,618
ABIACHA CREEK				
Land Treatment	65,944	731,488	797,432	
Land Stabilization	368,921	66,134	435,055	18,948
Streambank Stabilization	267,160	47,692	314,852	12,934
Floodwater Retarding Str.	862,519	69,195	931,714	36,537
Total	1,564,544	914,509	2,479,053	68,419
CHICOPA CREEK				
Land Treatment	22,964	414,004	436,968	
Land Stabilization	195,641	63,019	258,660	11,219
Streambank Stabilization	144,728	41,754	186,482	7,917
Floodwater Retarding Str.	346,828	27,888	374,716	14,789
Total	710,161	546,665	1,256,826	33,925
FANNEGUSHA CREEK				
Land Treatment	60,614	1,021,307	1,081,921	
Land Stabilization	471,816	165,866	637,682	28,430
Streambank Stabilization	244,908	71,096	316,004	13,220
Floodwater Retarding Str.	854,408	75,929	930,337	36,784
Total	1,631,746	1,334,198	2,965,944	78,434
BLACK CREEK				
Land Treatment	104,418	1,636,902	1,741,320	
Land Stabilization	757,200	326,599	1,083,799	51,023
Streambank Stabilization	275,640	93,191	368,831	15,877
Floodwater Retarding Str.	1,648,132	125,848	1,773,980	69,521
Total	2,785,390	2,182,540	4,967,930	136,421
Total Costs on Bluff Tributaries (Based on Detail and Reconnaissance Studies)				
Land Treatment	497,047	5,138,262	5,635,309	
Land Stabilization	2,450,570	1,002,619	3,453,189	169,374
Streambank Stabilization	1,792,438	418,647	2,211,421	92,006
Floodwater Retarding Str.	7,045,606	548,500	7,594,656	98,933
Total	11,785,661	7,108,028	18,894,575	560,313

Note: No annual costs calculated on land treatment measures. Total Federal cost amortized at 2½% for 50 years; total non-Federal cost amortized at 4% for 50 years; total annual cost minus federal and non-federal amortized costs is annual operation and maintenance costs.



YAZOO HEADWATER PROJECT
HILL TRIBUTARIES STUDIES
BLUFF AREA
PART III
MISSISSIPPI
SCALE 1"=5.5 MILES

LEGEND

WATERSHED BOUNDARY
RIVERS, STREAMS
PROBLEM AREA L-24
COUNTY LINE

MR57-156